

The Iron Age

A Review of the Hardware, Iron and Metal Trades.

Published every Thursday Morning by DAVID WILLIAMS, No. 83 Reade Street, New York.

Vol. XX: No. 9.

New York, Thursday, August 30, 1877.

\$4.50 a Year, Including Postage.
Single Copies, Ten Cents.

De Beaumont Patent Heater and Feeder and Condensing Pump.

We show herewith a patent feed-water heater and condensing pump, which is quite new, and has therefore but lately been put upon the market. Many appliances for using exhaust steam as a means of heating the boiler feed have been in use during late years, but as a means of avoiding intricate systems of pipes the present heater has some peculiar merits. In its simplest form it has but few more parts than an ordinary force pump, while it is quite effective in furnishing feed water at a temperature even as high as 190 to 200 degrees. This is accomplished by admitting a portion of the exhaust steam to the pump chamber and letting it mingle with the cold feed water which enters as spray. The combined mass then moves on to the boiler at the increased temperature. In Fig. 1 A represents the pump cylinder with its stuffing box; B is the plunger; D is the water inlet and G its check valve; C is the inlet for the exhaust steam and H its check valve; E is the exit for the water and condensed steam to the boiler, and F is the boiler check; I is a cock to blow out any sediment that may collect in the bottom of the pump barrel. There is no increase of back pressure produced by the operation of this pump, as the exhaust is perfectly free, merely being tapped to furnish the required supply for heating purposes. This has been estimated to take about one-sixth of the entire exhaust, and in engines working expansively, like the Corliss, where less steam and therefore less water is used for a given amount of work, one-eighth has been found sufficient. The condensation in the pump chamber is rapid and complete, the water passing into said chamber through a thimble split at right angles, which causes it to enter in the form of the spray before mentioned. The volume of water and steam is easily regulated to suit the necessities, and a very hot feed is thus obtained in the simplest manner by the addition of a single piece of pipe and a check valve. The arrangement was originally designed for locomotive pumps, where the immense quantities of steam required in a short time make a hot feed a matter of importance, but it is of course equally applicable to stationary boilers. It is said that, when used on locomotives, the quantity of exhaust taken for this purpose does not affect the draught, as many engineers suppose. This heater and feeder is in use at the Collins Printing House, 705 Jayne street, Philadelphia, where it can be seen in successful operation; and at D. B. Fuller & Co.'s bakery, No. 16 S. Eleventh street, Philadelphia. This pump may be driven direct or by a belt. When driven direct and used as a complete condenser, it has the form shown in Fig. 2. B is the steam cylinder and C the steam pipe; A is the cylinder of the condensing pump, five-twelfths the area of the steam cylinder; F is the water inlet; E the connection with the exhaust, and D the outlet for the condensed steam. The pump piston head is on the same rod as the steam piston, and as the exhaust from the steam cylinder passes through proper check valves to the opposite inlet of the water cylinder and is immediately condensed, there is a more or less perfect vacuum on opposite sides of the pistons and a gain in power equal to the difference in area between the two, multiplied by the pressure due to that vacuum. This pump will supply more hot water than is necessary to feed the boiler, some of which may therefore be used for other purposes. The condenser may be worked independently of the engine if required, like many other pumps. The action of this condenser is claimed to be so effective that a much smaller amount of water is required for the purpose than usual, and the engine is thus relieved of much of the duty expended in working the pumps. Further particulars can be obtained from De Beaumont Patent Condensing Pump Company, No. 721 Chestnut street, Philadelphia.

The Martini-Henry Rifle.

The rifle which is known as the Martini-Henry and which is used by all the Turkish soldiers, is a breech-loader, and was originally invented by a Boston gunsmith. I say invented, for although the rifle at present does not bear his name, the basic idea of it—the breech mechanism—most originated with him and not with Martini, as is generally supposed. This Boston gunsmith is named Henry O. Peabody. He had been connected for years with the Spencer Rifle Company, and in 1862 brought to the notice of the Providence Tool Company a breech-loading rifle he had invented. It was then in quite a rude form, but after careful study was advanced to such perfection that the tool company obtained control of the patent, and in 1865 took it to Europe in order to introduce it to the notice of the various governments. While the rifle was being canvassed in Europe a Hungarian gunmaker living in Switzerland, named M. Martini, saw the valuable and novel American invention, and set to work to improve it. The Peabody rifle had a side lock. Martini did away with

this, inventing a spiral spring inclosed in the block of the breech, and making some modifications of Peabody's ideas. The Martini rifle remained in abeyance for some time, the inventor showing it however to several European governments, but receiving no contracts for it. The Peabody rifle was manufactured by the Providence Tool Company to the number of 150,000, and sales were made in Europe and the United States. France purchased some 40,000, for use in the Franco-Prussian war; the army of Roumania took 25,000; Switzerland became a purchaser of 15,000, and small lots were disposed of in Cuba, Canada and other countries. In all cases the Peabody rifles gave great satisfaction.

In 1868 the English government arranged and carried out a most exhaustive test of all kinds of breech-loading rifles. The English Arms Commission decided finally that the system of rifling of the barrel, invented by Mr. Henry, the celebrated Scotch gunmaker of Edinburgh, and the Martini breech mechanism, combined in one rifle, was the most desirable. This combination rifle, which was denominated the Martini-Henry, was afterward adopted into the English army, and the British troops are now armed with it. The claims of Peabody as the original inventor of the basic principle of the Martini breech mechanism were discarded by the English government, and the honors given to the Hungarian, who was so fortunate as to suggest and apply certain improvements and modifications. Even the famed Henry rifling, it has been found, was originally invented and applied by a gunsmith in Northern New York State long before it appeared on the so-called Henry rifle. There

Not being satisfied with the Snider rifle, the Ottoman government concluded to adopt the Martini-Henry rifle, and in 1873 made a contract with the Providence Tool Company for 600,000 of these rifles, after precisely the same model as those adopted by the English government. The tool company held the Peabody patent, and also obtained the right to use the Martini improvement, and after a year or so of preparation for the extensive job began to turn out the rifles in 1874. The rifles called for in the Turkish contract are those denominated the Martini-Henry, and they are so called by the tool company in their dealing with Turkey, but they are called, when made for other parties, the Peabody-Martini rifles, as, although the Henry rifle is used, the name is discarded on the ground that the honor of the invention does not belong to Mr. Henry. The Peabody breech mechanism being the foundation for the Martini improvements, the tool company believe that Peabody's name should be associated with the rifle.

As already stated, when the Servian war began last fall the Turks engaged in that contest were only armed at first with the Snider rifle. Great shipments of the Martini-Henry rifle had been made by the tool company to Turkey, but they were in the government storehouses and had not been given into the hands of the soldiers. After a time a few thousand of the new rifles were sent to the Turkish army in Servia for trial. Almost immediately reports came back to the army headquarters from the generals in the field expressing great satisfaction with the Martini-Henry rifles, and requests were made that the Snider rifles should be withdrawn and the entire army in Servia supplied with

were quite interesting, and the scientific results were closely noted by the gentlemen present. A piece of common wrought iron, one inch long and with one-half a square inch area at the ends, was stood on end, and was found to resist 39,970 pounds pressure before it yielded, after which the fiber was destroyed, and it was crushed to about half its original length and spread to nearly double thickness, its consistency at the close of the test having become entirely granular. A piece of white pine wood, 2 inches square and 4 inches long, stood on end, commenced to crush at 19,250 pounds pressure, the grain of the wood telescoping at about the center and the block losing about an inch in length. A piece of close grained white ash wood of the same dimensions commenced to crush at 20,830 pounds, a wedge-shaped section being forced out laterally from the center of the block.

The next experiment was in crushing a round bar of cast iron, of the same size as the piece of wrought iron mentioned, viz., one-half a square inch area at the ends and 1 inch long. This was stood on end and yielded to 16,000 pounds pressure, breaking completely in the center, and showing a complete disintegration at the point of fracture, so much so that the particles of iron could be scraped from the surface of the fracture with the finger nail.

A piece of wire corl, about half an inch thick, with a cotton core, broke at 890 pounds tensile strain, after stretching over 50 per cent.

A bar of cast iron, turned down to half of a square inch section, was next submitted to tensile strain, when it broke at 18,020 pounds, showing a tensile strength of 36,040

tions and fines, requisitions, lodging and boarding troops, thefts, fires and all other war consequences, have been assumed by the government and amount to a grand total of \$177,000,000. The total amount of indemnities audited and granted up to the first of May last was \$123,430,000, and it is shown by figures and facts, that the aggregate pecuniary losses of the French nation inflicted by the war is not less than the enormous sum of \$1,200,000,000. Nearly the whole of this has been allowed and much of it already paid. Now, contrast this astounding financial depletion with the no less astounding exhibit of the Bank of France on the 24th of March, 1877, at which time there were in its vaults gold and silver reserves to the amount of \$445,688,244, and we are enabled to form a correct idea of the immense recuperative financial power of France.

Refractory Materials.—Prof. T. Eggleston, in a discourse on this subject, generalizes as follows: "These materials are usually clays, which are silicates of alumina and a few natural rocks. Rocks can rarely be used, as they are never homogeneous, and are liable to crack; clays cannot be used as they are found, but must be mixed with other substances. They are refractory, in proportion to the alumina they contain, and less useful, as they are acid; two or three per cent. of iron is sufficient to make a brick fusible at high temperature. Silica alone is exceedingly infusible, but has no binding power. The Dinas brick, which is silica, is formed by one and a half per cent. of lime, and will resist a clear, white heat alone, but is worthless if it comes in contact with metallic oxides; two per cent.

of oxide of iron would make such a brick useless in a Siemens-Martin furnace. A silica brick expands to such an extent that the rods of a furnace have to be loosened while it is being heated, and tightened when the furnace cools. Alumina is also very infusible, but it contracts at a high heat, and has therefore to be mixed with silica or burned clay to prevent this contraction, as any depressions or contractions would make eddies in the flame and rapidly destroy the furnace. Bauxite, a hydrated compound of alumina and iron, which sometimes contains a little silica and sometimes none at all, is also used. Siemens makes a brick of this substance which contains three to five per cent. of silica only, which is five times as infusible as the best Stourbridge brick. We have the anomaly of six per cent. of oxide of iron making one material as fusible as ordinary brick, and another containing over 20 per cent. of the same material being infusible. Lime and magnesia are also very refractory; they are both used to make crucibles for the fusion of platinum, but lime can only be had as a carbonate, which, under heat, becomes caustic, and when the heat is allowed to go down it slacks and falls to powder, so that it can only be used, as in Styria, in very small continuous furnaces. As lime is very friable, the campaigns are never long. Magnesia is also a very refractory material, but difficult to get. Besides the effect which the chemical composition has upon the refractoriness of materials, there is an effect due to molecular condition which has been but little studied and is still less understood."

Germany is about to try the experiment of exporting coal on a large scale, and an association has been formed with this object, called the "Westphalian Coal Export Association." Coal owners representing an output of 3,750,000 tons have, it is stated, already been enrolled, and an additional number of members is expected, sufficient to bring the total output represented to 6,000,000 tons. Several arrangements with many of the railway companies for the transit of coal to the North Sea ports have, says the Manchester Guardian, now for some time past been in operation, and in the ports both of the North Sea and the Baltic manifold relations have been opened with chambers of commerce, mercantile firms and wharf-owners, with a view to promoting the consumption and export of German coal in the joint interest of those concerned. Several cargoes have already been dispatched to St. Petersburg, Riga, Spain and other places, and additional contracts have been secured. Germany, according to a Westphalian journal, *Gluckauf*, can in a very short time increase her output 50 per cent., and is in a position to establish successfully a coasting and export trade in coal.—*Full Mall Gazette*.

It is estimated that the coast at the mouth of the Suez Canal, at Port Said, is advancing outward at the rapid rate of about 50 yards per annum, and that the necessity for extensive dredging will be greater year by year. Not less than 937,000 cubic yards of deposit had to be removed in 1875, while the dredging of 161,000 cubic yards sufficed in 1871. The British Government has ordered a new survey of the coast between Port Said and the Damietta mouth of the Nile, in order to ascertain the actual condition and the rate of increase of the sandbanks, and to see if any plan besides dredging can be adopted to check the growth of the obstruction.

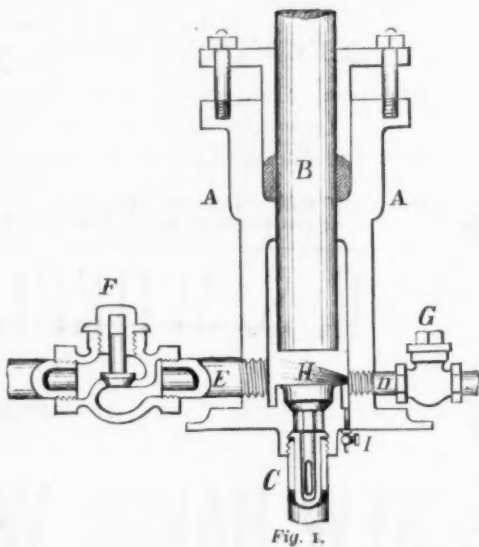


Fig. 1.

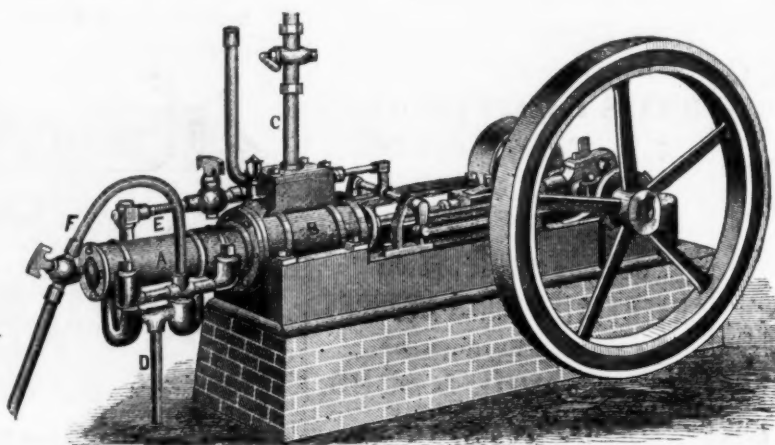


Fig. 2.

DE BEAUMONT'S HEATER AND FEEDER AND CONDENSING PUMP.

Riehle Brothers' Testing Machine.

In a recent issue of *The Iron Age* we presented to our readers an improved testing machine by Riehle Brothers, of Philadelphia. A few days ago a number of gentlemen were invited to witness experiments made upon a machine of that description, with still greater improvements. The machine has an upright iron frame, at the base of which is a hydraulic jack, from which the power is obtained by means of a small hand pump. The specimens to be tested are placed between grips, which communicate with a scale beam by which the amount of power in pounds is accurately shown during the entire test. The testing machine which was the special object of the visit is a duplicate of one built for the Ohio Agricultural and Mechanical College, Columbus, Ohio, for use in the technological education of the students. Its capacity is 40,000 lbs., and this amount of strain may be applied either as tension, crushing power or transverse bearing strain, the machine being so fitted that it may be applied to any of these modes. The changes can be made with the greatest facility from one kind of strain to another, overcoming the difficulty in this respect most satisfactorily. Some of the experiments

pounds to the inch. A bar of common wrought iron of the same size yielded to 19,000 pounds strain and commenced to stretch. At 2600 pounds strain it had lengthened .33 of an inch in 3 inches. At 27,300 pounds strain the iron lost its "life," and afterward broke, having lengthened .99 of an inch and reduced in diameter at the point of breakage nearly one-third.

Tests for lateral strain were next made. A common wrought iron bar, 1 inch square and 1 foot long between bearings, giving way at 4500 pounds pressure, and a bar of pine wood, 2 inches square and the same length, breaking at 2980 pounds pressure.

The Messrs. Riehle have also made for the Ohio University, at Columbus, a small testing machine of 100 pounds capacity, which is worked on the same principle, except that the power is obtained by a wheel and screw instead of from a hydraulic jack.

The machine tried yesterday was not by any means one of the most powerful made by the firm, its capacity being only 40,000 pounds, while they have constructed several of 75 tons, or 168,000 pounds capacity, some of which were made for the United States government.

We think a machine of this kind would be a valuable acquisition to any college, so that practical illustrations could be given of the strength of the various materials, and their behavior while under strain. English data has hitherto, we believe, been taken as correct, which experience has shown does not apply to the strength of our products, and has probably been the cause of many of the recent disasters.

Everybody is astonished at the recuperative financial power of France, but only comparatively few know the extent of that power. Germany demanded and obtained one thousand millions of dollars, but the French government lately published some very interesting and remarkable statistics, showing the actual amount of pecuniary damage done by the Franco-German war, which let in a flood of light on the subject. It appears that thirty-four departments, or three-eighths of France, were occupied by German troops, who, obeying the orders of their government, enforced the Napoleonic principle of "making war support war." The damage sustained by individuals and departments, whether by reason of contribu-

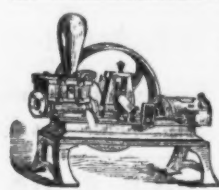


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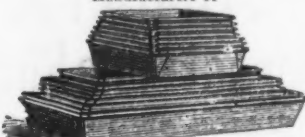
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The Labor Market in New South Wales.

In view of the fact that the English press is just now seeking to encourage in every possible way the emigration of skilled labor to the colonies, the following letter from an emigrant in New South Wales to the editor of the *Sheffield Independent* will be found interesting:

"As to the voyage hither, not one of our party of 350 emigrants was the worse, and many of them were the better for the trip. It is when the emigrant steps ashore that his troubles begin. He is under the same conditions as to obtaining employment as at home. If there is any difference, it is in favor of home. There is no running down to the ship to engage men, and no crowding of employers of labor at the emigrants' depot. Of the whole lot I only know of one man who got employment through government agency (of course excepting the young women). Of the mechanics, there are some who have been more months in the colony than they have done days' work. I will give a few instances of how we fared. I know a plumber who is on the tramp, picking up a day's work here and there by the way; a clerk, who is now a milkman at Bondi; a Thurgoland furnace-man, who, with some puddlers from Shropshire, are striking for a smith; a roller from Saville street is a bush policeman, as is also a cutter, and an M. S. and L. locomotive driver is carrying charcoal dust up a plank.

"My own experience is: I got a job in an iron bar mill at 36/ per week. I found the heat so oppressive and the labor so heavy that I gave up the billet at the week's end. I spent a week running after advertised jobs, and then took a billet which I should have scorned to take at home, and after a few weeks threw it up."

"Again, I was at the *Herald* office to secure an early copy, and applied for a job of a 'strong young man wanted in a store.' I was there with six others by 6.30 a. m., and at 8.30 a. m. not less than six times six were crowded about the entrance. We were told to apply at 2 p. m., at which hour not less than 50 men were waiting. A clerk took down the name of each one, and read his reference, and although he began at 2 p. m., my turn had not come at 2.45 p. m., and there was still a mob unseen. I was engaged by next morning's post to my surprise, at 35/ per week, of which I pay 20/ for board and lodging.

"Sydney swarms with unemployed men, as do all the cities on the coast of Australasia. The authorities say, 'These men are out of work because they won't work.' However, I happen to know men, mechanics—one with best references from the Peninsular and Oriental Company, and others of unquestionable character, who cannot obtain any employment, though they have earnestly and daily applied for it.

"If a man has £10 he may take up land in the bush and live in a log hut and have plenty of work doubtless. But even then the climate is so fickle that 50 per cent. of the crop is sure to be destroyed, either by drought or flood. There is also irregular employment to be got on the stations in the bush, at from 10/ to 20/ per week and board, but not a single comfort of civilization, and all the miseries of a semi-savage life. On the other side, I know of a carpenter, watchmaker, coach painter, compositor, plasterer, and brickmaker who have each done better here than at home. I do not wish to prejudice any of my townspeople against coming out here, but shall be very thankful if I am the means of placing them in a position to know what to expect should they come. There are many well-to-do people here who have risen from the ranks, and people of experience say that in the long run this country is best, but many may be found who hold the contrary to be true."

Locks of the Olden Time.

One of the great centers of the lock-making trade in England is Wolverhampton. This town has been famous for its locks time out of mind, and 200 years ago the town had skilled workmen, cunning to make fine locks.

One Dr. Plot, writing in 1686, says of Wolverhampton: "The greatest excellency of the blacksmith's profession in this county lies in their making of locks for doores, wherein the artisans of Wolverhampton seem to be preferred to all others, they making them in suites, six, eight or more in a suite, according as the chapman bespeaks them, whereof the keys shall neither of them open the other's lock, yet one master-key shall open them all. Nay, so curious are they in lock-work that they can contrive a lock that the master or mistress of a family sending a servant into their closets, either with a master-key or their own, can certainly tell by the lock how many times that servant has been in, at any distance of time, or how many times the lock has been shot for a whole year together, some of them being made to show it 300, 500, or 1000 times; nay, one of the chief workmen of the town told me he could make one that should show it 10,000 times. Further yet, I was told of a very fine lock, made in this town, sold for £20, that had a set of chimies in it, that could go at any hour the master should think fit. And these locks they make either with brass or iron boxes, so curiously polish'd and the keys so finely wrought that 'tis not reasonable to think they were ever exceeded unless by Tubal Cain, the inspired artificer in brass and iron." Dr. Wilkes, writing a century later, pays an equally flattering tribute to the skill of Wolverhampton artisans, and mentions that the number of locksmiths in Wolverhampton at that time was 731.

Wolverhampton has for generations also been celebrated for its locks and keys, and its artisans have acquired a considerable reputation for their ingenuity. In the year 1776, one James Lees, a workman in his sixty-fourth year, made a lock and key the weight of which did not exceed that of a silver two-pence, and he expressed his readiness to make a dozen locks and keys the total weight of which should not exceed a silver sixpence. At that time the number of locksmiths in Wolverhampton was 143. At the present time, however, the locks, chiefly manufactured at Wolverhampton are similar in kind, but of inferior quality, to those produced in Wolverhampton, with the exception of the

fine plate, which are not made there. Wolverhampton locks are much inferior to Wolverhampton make. They are all warded, the wards varying of course in strength and quality, known as common, fine, round, sash and solid wards. One peculiarity of the lock trade at Wolverhampton is its distribution among so many masters, the majority of whom employ only some six or eight men and boys. This system has introduced a spirit of rivalry and competition, of which purchasers of locks have not been slow to take advantage, and the consequence has been to reduce the price in some branches to so low a point that excellence of workmanship has given way to rapidity of production, and this has doubtless given rise to the familiar saying that if a Wolverhampton locksmith happens to let fall a lock in the process of manufacture he does not stay to pick it up, as he can make another in less time. The late Mr. G. B. Thorneycroft, who resided at Wolverhampton for a time, was once taunted that some padlocks were made in Wolverhampton that would only lock once; but when he was told the price—namely, two-pence—he replied, "Well, it would be a shame if they did lock twice for that money." It is said the same articles are now sold at one halfpenny each!

A Terrible Warning.

Some time ago two young mechanics in a Maryland town entered into a co-partnership as wheelwrights and carriage builders. Both gentlemen were possessed of shrewdness and industry, and were getting along in a very happy and contented way until they determined to venture upon a rash undertaking. Up to that time they had been able to take things easy. They had been coming to their shop in the morning just when they felt like it, and quitting in the evening just when they pleased. There was no hurry, no rush, no worry. Things went on in a smooth, sober, and comfortable manner. But, as was intimated above, they one day decided upon a change of tactics. They concluded to insert a conspicuous advertisement in the local daily. More than this, they actually had their names and business printed upon several hundred circulars, and caused the same to be extensively distributed. Then, with a recklessness that was truly astonishing, they managed to get themselves frequently mentioned in the local columns of the newspapers. They might have known that everybody would read those notices, but with a singular fatality they continued the same desperate management until at length they got themselves into a most awkward fix. The first intimation they had of coming trouble was when they realized that additional help must be employed. They employed additional help, but still their vexations were not over. Only last week they discovered that their shop was entirely too small. Then they bought lumber, employed workmen, and will have just about finished to-day another shop in the rear, somewhat larger than their original one. Strange infatuation! Both these clever young men might have been enjoying a comfortable nap this very afternoon if it had not been for their own unguarded conduct. But there is no further rest for them except on Sundays, and a few short hours after tea every day. We cannot say where it will all end. Deluded creatures! We warn them in time! If they don't mind they will be compelled to employ still other assistants, and make still other additions to their shop. But advice seems to be thrown away on such venturesome people. At all events, they should consider the example they are setting. They should remember that other mechanics and business men may go and do likewise. Then what a calamity will they have to contemplate! A town that was once quiet and sedate, rendered bustling and noisy with the hum of business, the buzz of factories, and the rush of accelerated commerce. We turn from the picture with fear and trembling.

Galvanizing Iron.—Molesworth gives the following directions for galvanizing iron—coating iron with zinc. The directions are very explicit and will be found valuable by many of our readers who have from time to time asked questions in regard to this kind of work. Pickle the article six or eight hours in water containing about 1 per cent. of sulphuric acid held in wooden vessels; the acid requires to be renewed from time to time, according to the quantity of iron pickled. After pickling scour and wash well in clean water. Keep the article under clean water (in which a little fresh burnt lime has been stirred) until ready for the next process. Immerse in chloride of zinc for one or two minutes until a skin of fine bubbles is formed on the surface. Chloride of zinc may be formed by saturating hydrochloric acid with metallic zinc until effervescence ceases, then decanting and adding a little sal-ammoniac. Dry the article on a heated iron plate, then immerse it in a bath of molten (not glowing) zinc until it acquires the temperature of the zinc bath. The surface of the molten zinc should be protected by sal-ammoniac, or some other substance. In some cases there is a partition at the surface of the bath, one portion of the surface being protected with sal-ammoniac, the other with a layer of charcoal. Beat the article while hot, to remove the excess of zinc.

What is said to be the largest plough ever manufactured has been turned out in a factory in Stockton, California. It is designed for work in the tules, and will cut a furrow 38 inches wide. A Mr. Barnhart has ordered it, as he holds to the theory in regard to tule ploughing that the furrows should be as wide as possible, and indeed it would be better if the whole sod could be turned over without making a furrow. The *Independent*, of the above place, says it will cut a furrow 38 inches wide. The mold-board is 8 feet long from the point to the end, sweeping upward with a curve of about four feet radius. At the end it stands two feet above the ground. The land side is 7 feet long. At the rear a horizontal cutting plate is arranged to cut under the sod on the land side a distance of ten inches. The furrow will be cut as shallow as possible, not exceeding three or four inches. The plough will be attached to a sulky, and will require a team of twelve stout animals to pull it.

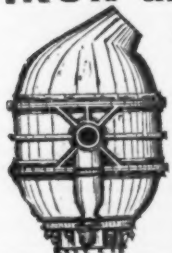
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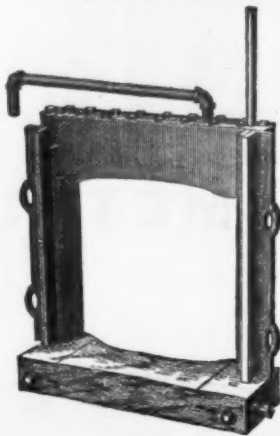
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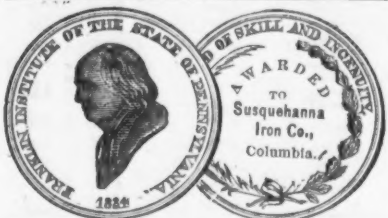
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ZINC.

The tonacity or strength of zinc is much below that of iron, and a closer framework is necessary in the parts of immediate support (the lath or roll), while, on the other hand, as a covering material impervious to rust, it is more to be relied on than the galvanized iron, which has only a coating of zinc. Although sometimes corrugated like the galvanized iron, zinc is more often laid in straight sheets, with corrugations only at the points of connection with the framework. For flat roofs, or for steep or "mansard" roofs, zinc is often used in situations where, formerly, lead was the only available material.

It is of great importance that zinc should be perfectly pure, for if it contain iron, as is frequently the case, it will not resist the action of the air. The best zinc used in this country is practically pure, as on analysis only the faintest traces of iron are found in it.

Zinc, though subject to oxidize, has this peculiarity, that the oxide does not scale off like that of iron, but forms a permanent coating on the metal impervious to the action of the atmosphere, and rendering the use of paint wholly unnecessary. The expansion and contraction of zinc are much greater than those of iron; hence in use proper attention must be paid to the circumstance, and plenty of play allowed in the laps, or a substantial and durable covering will not be obtained.

The thickness of zinc sheets is designated by a special gauge, whose divisions approximate to those of the B. W. G., but with the numbers differently arranged, as will be seen by the following table, where both sets of numbers are given. The weights per square foot are for perfectly plain sheeting, without corrugation or bends of any kind:—

	Zinc gauge.	Approx. weight per sq. ft.
2	13	16 oz.
3	14	19 "
4	15	22 "
5	16	25 "

Nos. 14 and 15 are the best for good work. No. 13 should only be used where it is necessary to exercise the greatest possible saving in first cost.

Zinc is generally rolled in sheets 3 ft. wide by 7 or 8 ft. long, and up to 10 ft. where specially ordered. The exact effective length and width, when applied to roofs, is given in the following description of the various modes of fixing.

The different modes of laying zinc roof covering are known by the following names, and the weights affixed are approximate and per square, including the corrugations and laps:—

No. of gauge.	13	14	15	16
1. Ordinary corrugation.	130	155	175	195
2. Plain roll cap.	130	150	170	190
3. Drawn roll cap.	135	155	175	195
4. Italian corrugation.	130	155	175	195

1. **Ordinary Corrugation** for zinc is now seldom used, except for side inclosures or for curved roofs, it having been mostly superseded by other methods. The effective width of the 3 ft. sheet, when corrugated, is 2 ft. 6 in. The purlines are generally of light timber or L iron.

2. **Plain Roll Cap (French Plan).**—This is laid on wood boarding with wood rolls, the ends of the sheets being turned up against the rolls in the width of the sheets and with a clip the whole width of the sheet. The clips are about 1½ in. long, placed at intervals. In the length of the sheet the joints are made with folding laps. By this plan, which is very similar to that in which lead is laid, the sheets are left perfectly free for contraction or expansion. The effective width of the sheets, i. e., from center to center of the rolls, is 2 ft. 10½ in.

3. **Drawn Roll Cap.**—This is laid similarly to the plain roll cap, but the wood rolls have the zinc drawn over them by machinery (Fig. 9), thus dispensing with the loose zinc roll cap. This method is preferred to Method 2 for strength, durability and the facility with which it can be laid, as the zinc sheets can be turned up just before they are put on the roof, and the drawn cap has then only to be dropped over the joints and screwed down. The effective width of the sheets according to this plan is 2 feet 11 inches.

4. **Italian Corrugation.**—This method (Fig. 10) is under most circumstances the best, and has the advantage that the sheets can be laid without boarding, and if the zinc be prepared in the usual way it can be laid by unskilled workmen. The sheets lap over each other on the rolls, and are screwed down as shown in Fig. 11. The effective width of the sheets is 2 feet 6 inches. The rolls are generally laid upon purlines placed about every 7 feet, but if necessary the distance may be increased by the use of stronger rolls. The usual depth for the rolls is 3 inches, but if laid upon boarding they need only be 2 inches deep. Zinc, on the Italian system, is very effective in relieving the monotonous appearance of a large surface.

The cost of zinc roofing depends on the current price of spelter, and on the shape and size of the roof.

Zinc being very ductile can be readily bent into shape, and can be cut and adjusted to

*The Vieille Montagne Company, in Belgium, who are the principal makers of zinc sheets in Europe, and from whom roof makers obtain their supplies, altered, in the year 1875, the numbers of the zinc gauge, reducing the thickness by one figure, No. 14 being the same as No. 13 was before 1875, No. 13 as No. 12, and so on.

the exact sizes. There are often special situations where considerable extra labor and cutting to waste are involved. But for plain roofing the following may be taken as approximate prices per square of the different systems just described, when spelter is at £22 per ton, including fastenings but no boarding or rolls: No. 13 gauge, £2. 10/-; No. 14, £2. 15/-; No. 15, £3; No. 16, £3. 5/-. Fixing the sheets costs from 10/- to 15/- per square. Packing for shipment about £1. 10/- per ton. The extra cost of wood rolls, as used for the Italian corrugation, is from 9/- to 11/- per square.

The demand for zinc is gradually increasing in England, but the quantity used annually is only about one-fifth of that used in France. Between 1860 and 1872, 4000 to 5000 tons of zinc roofing, chiefly Italian corrugation, were used for station buildings in India alone.

The comparative advantages of corrugated galvanized iron and zinc may be thus summarized: Zinc is not so well adapted as corrugated iron for places where there may be rough usage, and it requires a closer arrangement of the immediate supports. For the latter reason, also, it is more necessary for zinc to be laid on boarding. Rather more skill is necessary for laying zinc and making proper joints, and this of course is sometimes of consequence in roofs erected in foreign countries. Including the wood rolls, the fastenings and the closer framing necessary, the cost of laying the first expense of zinc is the greater; but where, other circumstances permitting, zinc can be conveniently fixed, the ultimate cost is generally less than that of galvanized iron, for the reason that under certain conditions of atmosphere, galvanized iron must be periodically painted (say once in four years) to make it last as long as zinc; and when the covering is worn out the old galvanized iron is absolutely worthless, while the old zinc sheets are worth in England from £14 to £16 per ton.

LEAD.

Lead as used for roofs is first cast into small sheets, and then rolled out to the size and thickness required, it then being called milled lead. The sheets are laid upon rolls, somewhat in the same manner as is shown with zinc, but with close boarding underneath. The necessary strength is stated by the weight of a superficial foot, 6 to 8 lbs. per foot being the strength generally specified for flats, and 5 lbs. or 6 lbs. for flashings.

Lead one-eighth inch thick weighs about 7½ lbs. per foot, and the cost of lead sheeting varies from 25/- to 30/- per cwt., according to the current price of pig lead. Lead is mostly suited for flat or steep roofs, but for all roofing purposes, and especially on iron roofs, it is now to a large extent superseded by zinc. Although weight for weight it is cheaper than zinc, the greater thickness necessary in lead renders it more expensive, but it will last proportionately longer.

FELT.

Felt, as used for roof covering is made of hair, wool, or vegetable fibre, these materials, singly or together, being matted and compressed and saturated with asphalt or bitumen, the cheaper kinds with ordinary tar. The felt is made in lengths of 25 yards by 32 in. wide, and for roofs is about ½ in. thick. Dry felt without tar, as used for lining walls, is made in sheets 34 in. by 20 in., and occasionally in rolls, the thickness varying from ½ to ½ in. Good felt is impervious to rain or snow; it is a non-conductor of heat and sound; is elastic, light, economical and easy of application. For temporary sheds or wooden houses it is used as an outer covering, and will last a considerable time under most conditions of climate. Felt sheeting, made stiff like pasteboard, can be placed directly upon roof framing without any wooden or other lining. But for permanent structures felt is used only as an inner lining and is applied both to the roofs and sides of buildings. As it serves equally as a protection from heat, cold and damp, it is serviceable in all climates. For roofs it is generally placed upon wooden boarding, and the outer covering—slates, galvanized iron or zinc—is bedded upon it. In buildings, bridges, and other structures, felt is often placed as a cushion between iron and iron, iron and stone, iron and wood to prevent jarring and percussive strains. Good roofing felt, about ½ in. thick, costs about one penny per square foot, and the dry felt of thicker sizes in proportion.

GLASS.

The kind of glass suitable for iron roofs depends on the purpose for which the building is intended, and the area in the roof available for sky-lights. If this area be small it is necessary to utilize it to the utmost, and, therefore, to use clear, transparent glass. Clear sheet glass is used in such cases, and also where, for conservatories and other ornamental buildings, the greatest possible light or the best looking material is required. But for ordinary iron roofs, such as are made for railway stations, store-houses, factories, etc., it is seldom necessary to use clear glass, and a coarser, stronger kind is usually employed. Glass known as "patent rolled rough plate," is most suitable for skylights, and also, if transparent windows are not required, for the sides of such buildings.

The cost of glass depends upon the size of the panes and its thickness, and the latter is determined mainly by the width between the sash bars. Where the width does not exceed 12 inches, glass ½ inch thick is quite sufficient to resist ordinary hail storms, and glass 3-16 inch to ¼ inch for a width of from 12 to 20 inches. Where the thickness can be expressed in the ordinary fraction of an inch, as above, the rough glass is so described; but for sheet glass thinner than ½ inch the weight in ounces per square foot is specified.

Rough, rolled plate may be obtained in sheets from 12 to 20 inches wide and up to 70 inches long, but widths of from 8 to 14 inches are most usual, and it is generally found better, and as against fracture safer, not to use sheets longer than four times their width. Panes of ordinary size cost about 5d. per square foot of ½ inch thick, and 9d. per foot of ¼ inch thick.

"Fluted rolled rough plate," of the same kind as that mentioned above, but rolled with small flutes either four or eleven per inch, is stronger, and costs about 1½d. per foot more.

Clear transparent glass is always specified by its weight per foot, and the cost increases with the size of the panes. Moderate sized sheets of 21 oz. glass (an ordinary thickness) cost from 6d. to 8d. per square foot, according to quality.

Glazing costs 1d. to 2d. per square foot, according to the height from the ground and other circumstances. Wood sash bars cost from 1d. to 3d. per lineal foot, according to the section.

Sash bars, in shape nearly resembling those in wood, are rolled in wrought iron from 1 in. to 3 in. deep. They weigh from ½ lb. to 5 lbs. per foot, and cost from 13/- to 16/- per cwt. Although in iron roofs such sash bars are frequently used, it is difficult with them to keep the roof watertight, owing to the expansion and contraction of the iron and glass not being in the same ratio. For this reason wood sash bars are often employed for iron roofs, but in any case the risk of breakage may be lessened by using putty made in such a way as not to become brittle. Bars of T iron from 1 in. to 1½ inch deep may be used as sash bars. For bars of deep and strong section, cast instead of wrought iron is often used, as more convenient for the connections and as more durable against rust. So also complete sash frames are made of cast iron.

Glass may be bent to any curve to suit a circular or domed roof; but it is often, especially in foreign countries, difficult to replace glass of this sort when broken. Stained or colored glass is often employed in conservatories.

In roofs covered with slates or tiles, where it is difficult or undesirable to insert skylights, or to use sash bars, glass, shaped as tiles and slates may be adopted, these being made so that they will work in with ordinary tiles and slates.

Practical Dealing With the Labor Question.

In conversation with a prominent gentleman of this city, Mr. Chaffee, the trustee and manager of the A. & W. Sprague estate, made a statement full of suggestions to those interested in the labor problem. This estate now employs about ten thousand hands, and Mr. Chaffee says that, although these hands are now receiving less wages than at any period since the establishment of the Sprague Works, nearly a half century since, he has never seen them so contented. He ascribes the cheerful condition of his working people under low wages amid general labor disturbances mainly to the fact that the estate furnishes each head of a family enough ground for a good-sized garden, or from one-quarter to one-half acre of tillable ground. The scant wages have forced them to carefully cultivate these little plots, and the people find they can almost raise subsistence for their families. So, instead of want, they have fair support and even many luxuries, and from the lowest wages are able to lay by. Besides, the care of cultivating these gardens, and keeping a pig or cow, or both, not only holds the men from the dissipation incident to idle hours, but furnishes healthful recreation and inculcates a home sentiment and sense of security and proprietorship that eminently improves the morale of the laborer. This arrangement affords a safety valve and protection to both employer and employee. Wages can be reduced without instantly threatening starvation. The laborer is withheld from hasty severance of his connection with employer by regard for located home interests. But when there is a surplus of miners or artisans, and some must be idle or seek other pursuit than the accustomed trade, then this miniature farming has opened the way to work that will always support. It is giving skilled laborers in one branch a reserve trade which they can always fall back upon in emergency, and removes that pitiable helplessness that attacks the strongest mechanic when thrust from his regular trade.

Fishing for Russian Torpedoes.—A letter from Erzeroum in the Hamburg Correspondent gives some particulars of the new corps of divers which has been organized by the Turkish government for the purpose of removing the torpedoes laid down by the Russians in the Danube and on the shores of the Black Sea. These divers, says the correspondent, are Mohammedans from Lazistan, and a certain number of them are attached to each of the Turkish squadrons cruising in the Black Sea. When the ships arrive near a spot where the existence of torpedoes is suspected, two of the divers row to the place in a very light boat drawing so little water that there is scarcely any danger of its striking against the torpedoes. On arriving at their destination one of the rowers dives into the sea; if he finds a wire or rope by which the torpedo is attached he cuts it with a sharp instrument and returns quickly into the boat. The liberated torpedo floats to the surface of the water, the men pass a sort of lasso round it, take it in tow, and then row back to the ship as quickly as possible. For each torpedo thus captured the divers are paid \$45, and also a sum of money equal to one-half of its value. Although the men have been often employed on this dangerous service, not a single accident has yet occurred to any of them.

The *Celestial Empire*, published in Shanghai, China, offers some suggestions that might be of value on this side of the globe, as the temperature which calls forth the remarks is not higher than that of most American cities in midsummer. The Chinese practice of roofing their streets in hot weather with a temporary covering of matting is spoken of in terms of high approval. Streets thus shaded are said to furnish a most agreeable arcade. It is further suggested that the air beneath the matting might advantageously be kept in motion by out-door punkahs. Indoors there are plenty of inventions for warming houses, but very few for cooling them. A little of the ingenuity which has been expended on hot-air furnaces, steam radiators and the like, might well be applied to the problem of cooling our apartments in Summer. What a delightful convenience it would be, for instance, to be able by merely turning the button of a register to let a cool wind pour into a room at any moment! Must we wait till the next generation introduces the latest improvements before we can have both hot and cold air, as well as hot and cold water in our houses!

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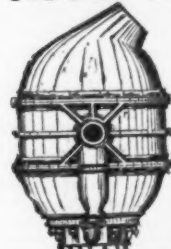
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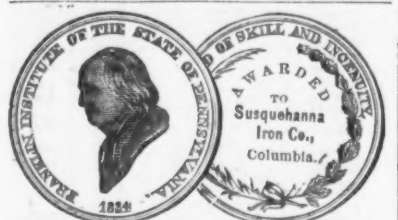
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ZINC.

The tenacity or strength of zinc is much below that of iron, and a closer framework is necessary in the parts of immediate support (the lath or roll), while, on the other hand, as a covering material impervious to rust, it is more to be relied on than the galvanized iron, which has only a coating of zinc. Although sometimes corrugated like the galvanized iron, zinc is more often laid in straight sheets, with corrugations only at the points of connection with the framework. For flat roofs, or for steep or "mansard" roofs, zinc is often used in situations where, formerly, lead was the only available material.

It is of great importance that zinc should be perfectly pure, for if it contain iron, as is frequently the case, it will not resist the action of the air. The best zinc used in this country is practically pure, as on analysis only the faintest traces of iron are found in it.

Zinc, though subject to oxidize, has this peculiarity, that the oxide does not scale off like that of iron, but forms a permanent coating on the metal impervious to the action of the atmosphere, and rendering the use of paint wholly unnecessary. The expansion and contraction of zinc are much greater than those of iron; hence in use proper attention must be paid to the circumstance, and plenty of play allowed in the laps, or a substantial and durable covering will not be obtained.

The thickness of zinc sheets is designated by a special gauge, whose divisions approximate to those of the B. W. G., but with the numbers differently arranged, as will be seen by the following table, where both sets of numbers are given. The weights per square foot are for perfectly plain sheeting, without corrugation or bends of any kind.*

	Zinc gauge.	Approx. weight per sq. ft.
2	13	16 oz.
3	14	19 "
4	15	22 "
5	16	25 "

Nos. 14 and 15 are the best for good work. No. 13 should only be used where it is necessary to exercise the greatest possible saving in first cost.

Zinc is generally rolled in sheets 3 ft. wide by 7 or 8 ft. long, and up to 10 ft. where specially ordered. The exact effective length and width, when applied to roofs, is given in the following description of the various modes of fixing.

The different modes of laying zinc roof covering are known by the following names, and the weights affixed are approximate and per square, including the corrugations and laps:

No. of gauge.	13	14	15	16
Lbs.	Lbs.	Lbs.	Lbs.	Lbs.
1. Ordinary corrugation.	130	155	175	195
2. Plain roll cap.	130	150	170	190
3. Drawn roll cap.	135	155	175	195
4. Italian corrugation.	130	155	175	195

1. **Ordinary Corrugation** for zinc is now seldom used, except for side inclosures or for curved roofs, it having been mostly superseded by other methods. The effective width of the 3 ft. sheet, when corrugated, is 2 ft. 6 in. The purlines are generally of light timber or L iron.

2. **Plain Roll Cap (French Plan).**—This is laid on wood boarding with wood rolls, the ends of the sheets being turned up against the rolls in the width of the sheet and with a cap the whole width of the sheet. The clips are about 1½ in. long, placed at intervals. In the length of the sheet the joints are made with folding laps. By this plan, which is very similar to that in which lead is laid, the sheets are left perfectly free for contraction or expansion. The effective width of the sheets, i. e., from center to center of the rolls, is 2 ft. 10½ in.

3. **Drawn Roll Cap.**—This is laid similarly to the plain roll cap, but the wood rolls have the zinc drawn over them by machinery (Fig. 9), thus dispensing with the loose zinc roll cap. This method is preferred to Method 2 for strength, durability and the facility with which it can be laid, as the zinc sheets can be turned up just before they are put on the roof, and the drawn cap has then only to be dropped over the joints and screwed down. The effective width of the sheets according to this plan is 2 feet 11 inches.

4. **Italian Corrugation.**—This method (Fig. 10) is under most circumstances the best, and

has the advantage that the sheets can be laid without boarding, and if the zinc be prepared in the usual way it can be laid by unskilled workmen. The sheets lap over each other on the rolls, and are screwed down as shown in Fig. 11. The effective width of the sheets is 2 feet 6 inches. The rolls are generally laid upon purlines placed about every 7 feet, but if necessary the distance may be increased by the use of stronger rolls. The usual depth for the rolls is 3 inches, but if laid upon boarding they need only be 2 inches deep. Zinc, on the Italian system, is very effective in relieving the monotonous appearance of a large surface.

The cost of zinc roofing depends on the current price of spelter, and on the shape and size of the roof.

Zinc being very ductile can be readily bent into shape, and can be cut and adjusted to

*The Vieille Montagne Company, in Belgium, who are the principal makers of zinc sheets in Europe, and from whom roof makers obtain their supplies, altered, in the year 1875, the numbers of the zinc gauge, reducing the thickness by one figure, No. 14 being the same as No. 13 was before 1875; No. 13 as No. 12, and so on.

the exact sizes. There are often special situations where considerable extra labor and cutting to waste are involved. But for plain roofing the following may be taken as approximate prices per square of the different systems just described, when spelter is at \$22 per ton, including fastenings but no boarding or rolls: No. 13 gauge, £2. 10/-; No. 14, £2. 15/-; No. 15, £3/-; No. 16, £3. 5/-. Fixing the sheets costs from 10/- to 15/- per square. Packing for shipment about £1. 10/- per ton. The extra cost of wood rolls, as used for the Italian corrugation, is from 9/- to 11/- per square.

The demand for zinc is gradually increasing in England, but the quantity used annually is only about one-fifth of that used in France. Between 1860 and 1872, 4000 to 5000 tons of zinc roofing, chiefly Italian corrugation, were used for station buildings in India alone.

The comparative advantages of corrugated galvanized iron and zinc may be thus summarized: Zinc is not so well adapted as corrugated iron for places where there may be rough usage, and it requires a closer arrangement of the immediate supports. For the latter reason, also, it is more necessary for zinc to be laid on boarding. Rather more skill is necessary for laying zinc and making proper joints, and this of course is sometimes of consequence in roofs erected in foreign countries. Including the wood rolls, the fastenings and the closer framing necessary, the cost of laying the first expense of zinc is the greater; but where, other circumstances permitting, zinc can be conveniently fixed, the ultimate cost is generally less than that of galvanized iron, for the reason that under certain conditions of atmosphere, galvanized iron must be periodically painted (say once in four years) to make it last as long as zinc; and when the covering is worn out the old galvanized iron is absolutely worthless, while the old zinc sheets are worth in England from £14 to £16 per ton.

LEAD.

Lead as used for roofing is first cast into small sheets, and then rolled out to the size and thickness required, it then being called milled lead. The sheets are laid upon rolls, somewhat in the same manner as is shown with zinc, but with close boarding underneath. The necessary strength is stated by the weight of a superficial foot, 6 to 8 lbs. per foot being the strength generally specified for flats, and 5 lbs. or 6 lbs. for flashings.

Lead one-eighth inch thick weighs about 7½ lbs. per foot, and the cost of lead sheeting varies from 25/- to 30/- per cwt., according to the current price of pig lead. Lead is mostly suited for flat or steep roofs, but for all roofing purposes, and especially on iron roofs, it is now to a large extent superseded by zinc. Although weight for weight it is cheaper than zinc, the greater thickness necessary in lead renders it more expensive, but it will last proportionately longer.

FELT.

Felt, as used for roof covering is made of hair, wool, or vegetable fibre, these materials, singly or together, being matted and compressed and saturated with asphalt or bitumen, the cheaper kinds with ordinary tar. The felt is made in lengths of 25 yards by 32 in. wide, and for roofs is about ½ in. thick. Dry felt without tar, as used for lining walls, is made in sheets 34 in. by 20 in., and occasionally in rolls, the thickness varying from ¼ to ½ in. Good felt is impervious to rain or snow; is a non-conductor of heat and sound; is elastic, light, economical and easy of application. For temporary sheds or wooden houses it is used as an outer covering, and will last a considerable time under most conditions of climate. Felt sheeting, made stiff like pasteboard, can be placed directly upon roof framing without any wooden or other lining. But for permanent structures felt is used only as an inner lining and is applied both to the roofs and sides of buildings. As it serves equally as a protection from heat, cold and damp, it is serviceable in all climates. For roofs it is generally placed upon wooden boarding, and the outer covering—slates, galvanized iron or zinc—is bedded upon it. In buildings, bridges, and other structures, felt is often placed as a cushion between iron and iron, iron and stone, iron and wood to prevent jarring and percussive strains. Good roofing felt, about ½ in. thick, costs about one penny per square foot, and the dry felt of thicker sizes in proportion.

GLASS.

The kind of glass suitable for iron roofs depends on the purpose for which the building is intended, and the area in the roof available for skylights. If this area be small it is necessary to utilize it to the utmost, and, therefore, to use clear, transparent glass. Clear sheet glass is used in such cases, and also where, for conservatories and other ornamental buildings, the greatest possible light or the best looking material is required. But for ordinary iron roofs, such as are made for railway stations, store-houses, factories, etc., it is seldom necessary to use clear glass, and a coarser, stronger kind is usually employed. Glass known as "patent rolled rough plate," is most suitable for skylights, and also, if transparent windows are not required, for the sides of such buildings.

The cost of glass depends upon the size of the panes and its thickness, and the latter is determined mainly by the width between the sash bars. Where the width does not exceed 12 inches, glass ¼ inch thick is quite sufficient to resist ordinary hail storms, and glass 3-16 inch to ¼ inch for a width of from 12 to 20 inches. Where the thickness can be expressed in the ordinary fraction of an inch, as above, the rough glass is so described; but for sheet glass thinner than ¼ inch the weight in ounces per square foot is specified.

Rough, rolled plate may be obtained in sheets from 12 to 20 inches wide and up to 70 inches long, but widths of from 8 to 14 inches are most usual, and it is generally found better, and as against fracture safer, not to use sheets longer than four times their width. Panes of ordinary size cost about 5d. per square foot, of ¼ inch thick, and 6d. per foot of ½ inch thick.

"Fluted rolled rough plate," of the same kind as that mentioned above, but rolled with small flutes either four or eleven per inch, is stronger, and costs about 1½d. per foot more.

Clear transparent glass is always specified by its weight per foot, and the cost increases with the size of the panes. Moderate sized sheets of 21 oz. glass (an ordinary thickness) cost from 6d. to 8d. per square foot, according to quality.

Glazing costs 1d. to 2d. per square foot, according to the height from the ground and other circumstances. Wood sash bars cost from 1d. to 3d. per lineal foot, according to the section.

Sash bars, in shape nearly resembling those in wood, are rolled in wrought iron from 1 in. to 3 in. deep. They weigh from ½ lb. to 5 lbs. per foot, and cost from 13/- to 16/- per cwt. Although in iron roofs such sash bars are frequently used, it is difficult with them to keep the roof watertight, owing to the expansion and contraction of the iron and glass not being in the same ratio. For this reason wood sash bars are often employed for iron roofs, but in any case the risk of breakage may be lessened by using putty made in such a way as not to become brittle. Bars of T iron from 1 in. to 1½ inch deep may be used as sash bars. For bars of deep and strong section, cast instead of wrought iron is often used, as more convenient for the connections and as more durable against rust. So also complete sash frames are made of cast iron.

Glass may be bent to any curve to suit a circular or domed roof; but it is often, especially in foreign countries, difficult to replace glass of this sort when broken. Stained or colored glass is often employed in conservatories.

In roofs covered with slates or tiles, where it is difficult or undesirable to insert skylights, or to use sash bars, glass, shaped as tiles and slates may be adopted, these being made so that they will work in with ordinary tiles and slates.

Practical Dealing With the Labor Question.—In conversation with a prominent gentleman of this city, Mr. Chaffee, the trustee and manager of the A. & W. Sprague estate, made a statement full of suggestions to those interested in the labor problem. This estate now employs about ten thousand hands, and Mr. Chaffee says that, although these hands are now receiving less wages than at any period since the establishment of the Sprague Works, nearly a half century since, he has never seen them so contented. He ascribes the cheerful condition of his working people under low wages amid general labor disturbances mainly to the fact that the estate furnishes each head of a family enough ground for a good-sized garden, or from one-quarter to one-half acre of tillable ground. The scant wages have forced them to carefully cultivate these little plots, and the people find they can almost raise subsistence for their families. So, instead of want, they have fair support and even many luxuries, and from the lowest wages are able to lay by. Besides, the care of cultivating these gardens, and keeping a pig or cow, or both, not only holds the men from the dissipation incident to idle hours, but furnishes healthful recreation and inculcates a home sentiment and sense of security and proprietorship that eminently improves the morale of the laborer. This arrangement affords a safety valve and protection to both employer and employee. Wages can be reduced without instantly threatening starvation. The laborer is withheld from hasty severance of his connection with employer by regard for located home interests. But when there is a surplus of miners or artisans, and some must be idle or seek other pursuit than the accustomed trade, then this miniature farming has opened the way to work that will always support. It is giving skilled laborers in one branch a reserve trade which they can always fall back upon in emergency, and removes that pitiable helplessness that attacks the strongest mechanic when thrust from his regular trade.

Fishing for Russian Torpedoes.—A letter from Erzeroum in the Hamburg Correspondent gives some particulars of the new corps of divers which has been organized by the Turkish government for the purpose of removing the torpedoes laid down by the Russians in the Danube and on the shores of the Black Sea. These divers, says the correspondent, are Mohammedans from Lazistan, and a certain number of them are attached to each of the Turkish squadrons cruising in the Black Sea. When the ships arrive near a spot where the existence of torpedoes is suspected, two of the divers row to the place in a very light boat drawing so little water that there is scarcely any danger of its striking against the torpedoes. On arriving at their destination one of the rowers dives into the sea; if he finds a wire or rope by which the torpedo is attached he cuts it with a sharp instrument and returns quickly into the boat. The liberated torpedo floats to the surface of the water, the men pass a sort of lasso round it, take it in tow, and then row back to the ship as quickly as possible. For each torpedo thus captured the divers are paid \$45, and also a sum of money equal to one-half of its value. Although the men have been often employed on this dangerous service, not a single accident has yet occurred to any of them.

The Celestial Empire, published in Shanghai, China, offers some suggestions that might be of value on this side of the globe, as the temperature which calls forth the remarks is not higher than that of most American cities in midsummer. The Chinese practice of roofing their streets in hot weather with a temporary covering of matting is spoken of in terms of high approval. Streets thus shaded are said to furnish a most agreeable arcade. It is further suggested that the air beneath the matting might advantageously be kept in motion by out-door punkahs. Indoors there are plenty of inventions for warming houses, but very few for cooling them. A little of the ingenuity which has been expended on hot-air furnaces, steam radiators and the like, might well be applied to the problem of cooling our apartments in summer. What a delightful convenience it would be, for instance, to be able by merely turning the button of a register to let a cool wind pour into a room at any moment! Must we wait till the next generation introduces the latest improvements before we can have both hot and cold air, as well as hot and cold water in our houses?

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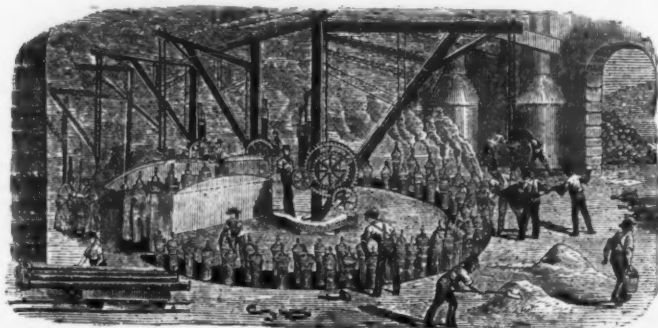
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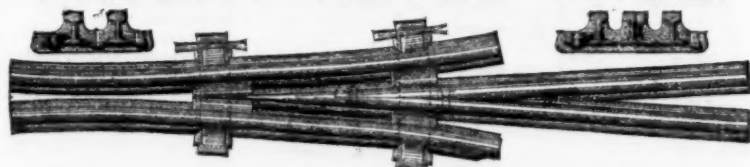
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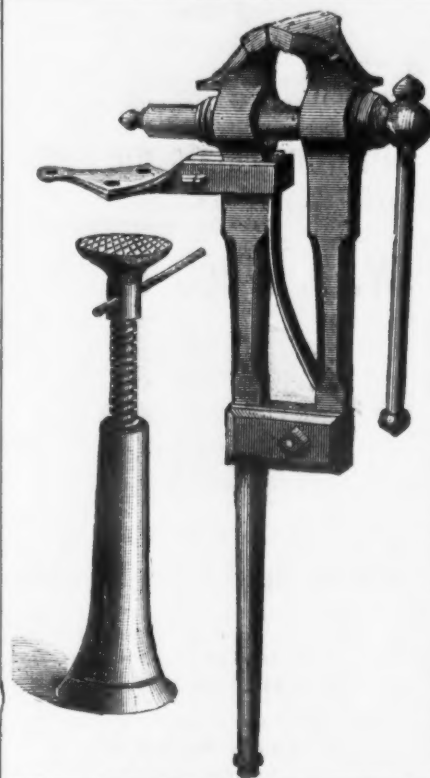
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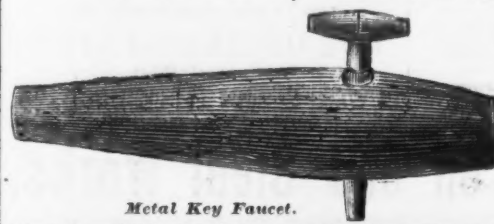
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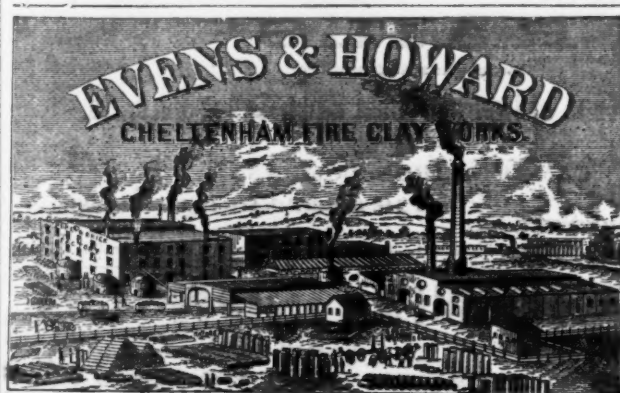
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Maltby's Britannia and Cocoa Dippers. Eddy's Reduced Lamp Black. "Eagle" Axe, Pick and other Handles. "Korona" Flat, Sand and Emery Papers. Cortlandt Forged Horse Nails. Tackle Blocks, Spokes, &c., &c.

GLOBE NAIL COMPANY,

MANUFACTURERS OF

Pointed Polished & Finished Horse Shoe Nails.

Recommended by over 20,000 Horse Shoers.

All nails made from best NORWAY IRON, and warranted perfect and ready for driving. Orders filled promptly and at lowest rates by

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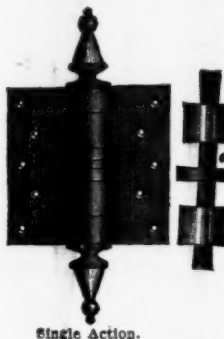
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Japanned, Enamelled, Nickel Plated
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Hydraulic Rams, etc., and all with the most modern
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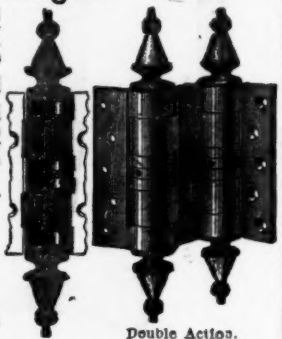
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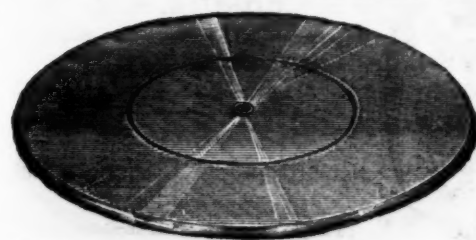
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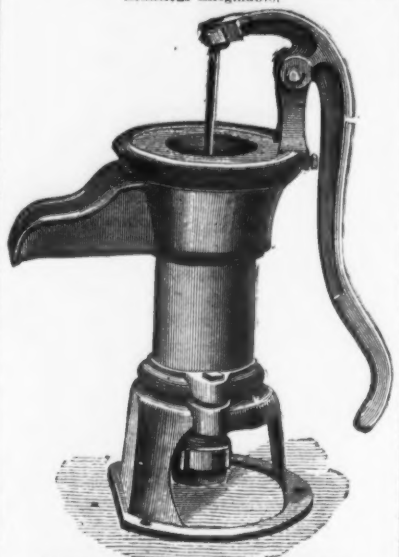
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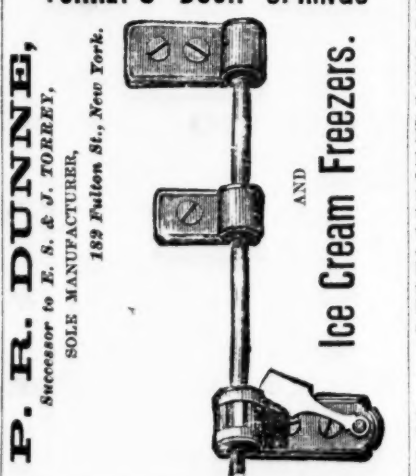
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Pans, Basins, Cuspidors, Spittoons, &c., &c.
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Trade supplied.

The early history of the manufacture of
tinned hollow-ware is of no little interest.
The manufacture of hollow-ware in England
seems to have been begun almost as soon as
the art of iron founding was known. The
manufacture of tinned hollow-ware, how-
ever, is of more modern origin, dating back
about a century.

The entire process by which tinned hollow-ware is manufactured was patented by one Jonathan Taylor (said to have been a workman at the Eagle Foundry, Birmingham, England), in November, 1779. Taylor's claim, extracted from the specification of his patent, is for "An invention for casting oval-bellied cast iron pots, and 'nealing, turning, tinning and finishing the same, and also 'nealing, turning, tinning and finishing such kinds of round cast iron pots and saucepans as are made with a head or rim round

The Fall Trade.

The Philadelphia *North American* says: There is really a fair prospect of a good fall trade, and the pioneer indications have already been felt in the dry goods line, which always leads the van. With the reopening of railway travel there has come an influx of mercantile visitors from the interior, as well as unusually large receipts of produce. The deadness of the summer is fast giving way to a brisk movement. But there are frequent and desperate efforts to prolong the stagnation by reports of fresh railroad strikes, and by the propagation of absurd rumors of all kinds of trouble, apparently set in circulation by some central authority engaged in working the wires far and near in some speculative scheme at the expense of the general prosperity. Undeniably the success of these aims is aided by the sensitiveness of the public mind and the absence of any commanding progressive movement. So long as the attention of the people remains so wide awake to every appearance of possible or probable disaster, active business enterprise will labor under manifest impediments.

The receipts of breadstuffs and provisions since the restoration of railroad traffic have been large and steady, and have given a new impetus to shipments to Europe and the West Indies and South America. Live stock is also arriving very freely from the interior, and the petroleum movement looks lively again. Coal was not interrupted at all in the Schuylkill region in its shipments, and the Reading receipts continue very large, while prices are advancing at all the leading marts of the trade. As the renewed agitation for a free-trade tariff must again unsettle foreign imports and induce importers to hold off and await developments before ordering fresh cargoes, as well as to sell off as fast as possible the stocks in hand to avoid possible loss consequent upon a low tariff, the field for domestic goods is better than it was. Indeed, the same feeling of uncertainty just alluded to in reference to the import trade ought, and undoubtedly does, operate to force sales of domestic goods to avoid chances of loss on accumulated stocks of manufactured products in warehouse and in store.

Notwithstanding the attention attracted by the return to Europe of a few mechanics to seek employment, there are evidences of a reopening of the European immigration movement to avoid the sweeping military systems of the old world. Some 5000 poor immigrants have arrived at New York, and there is a manifest increase also at Philadelphia. The through ticket arrangement from Europe to the Western frontier, however, doesn't appear to be as actively at work as could be desired, and the consequence of the influx is an overflow of the crowded labor markets of the seaboard. In any Western region where there is a large demand for agricultural laborers the trunk-line railways could furnish an unlimited supply. If the recent outbreaks do not accomplish good in any other way, they may perhaps induce a general and organized movement to establish systematic emigration to the Western frontiers under the auspices of the trunk-line railways and the foreign steamship lines.

Southern trade receives more attention since the restoration of peace and harmony in that section turned the people from political agitation to agriculture, manufactures, mining and commerce, and a belief is gaining ground that a large part of the surplus products of industry at the North could be profitably worked off in the Southern markets, and that considerable sacrifices would be justifiable to secure permanent possession of the trade. The general unprofitableness of Southern railways is caused largely by the absence of the class of merchandise which at the North constitutes the best reliance of the companies for revenues; and this absence has been due to the hue and cry raised at the North against the Southern trade, which has scared away the mass of the Northern merchants from venturing into such a field. An impression is gaining force that this trade might be made far more profitable than that of a large part of the foreign countries now engaging so much of our exports. Political misrepresentations and sectional prejudices have been allowed too much way in restraining manufacturers and merchants from seeking to cultivate this traffic.

The efforts of wreckers and croakers to extend and perpetuate the general want of confidence among capitalists and investors have affected all values so much as to have caused an indiscriminate reaction. In fact the thing was so obviously overdone in the effort to produce a universal panic that investors have felt the necessity of throwing aside their excessive caution if they would not eat up their principal instead of earning any interest on their capital. It has, however, so long been customary to complain of the universal dullness that even when any line of business is moderately active it is slurred over in the verbal reports. Aggregate trade reports give totals that are singularly at variance with these sweeping complaints, and lead us to wonder that the enormous transactions thus indicated are never spoken of in the daily reports. When things are really dull, the report usually is that there is nothing doing. When they are excitingly active, the report says "fair business." There is always some wonderful time expected that never comes, when everybody is to make money and no one to lose any.

Tinned Hollow Ware.

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the top." Taylor's patent was bought and worked by Messrs. Izon & Whitehurst, who were engaged in the manufacture of cast ironmongery at a small foundry in Duke street, Birmingham. Whether this firm had attempted the manufacture of black (unfished) hollow-ware, or of the improved tinned hollow-ware, before their purchase of Taylor's patent, is not certainly known; that they made articles of cast ironmongery—now distinguished by the trade name of odd-work—at that time, is inferred from the fact that the firm always combined the manufacture of these articles with that of tinned and black hollow-ware since the introduction of the latter, and were also patentees of an invention for making cast hinges, with the secret joint, in 1775. This invention for casting hinges was for joining the two halves or flaps of the hinge in the casting, instead of casting them separately and fitting them together afterward. The wire running through the two halves of the joint is surrounded by the cast metal and is entirely hidden; hence the name of secret hinges.

The advantages the improved tinned kitchen furniture, as it was called, possessed were that it could be made in any shape required, was light and convenient in use, was elegant in appearance—at least compared with the three-leg pot which it superseded to a great extent—and was much cheaper than brass or copper cooking vessels. As a consequence it met with ready sale, and Messrs. Izon & Co. found it necessary to quit their confined premises in Duke street and remove their business to West Bromwich, where, in addition to a convenient site for the works, they had the use of water power. This removal took place at Michelmass, in the year 1780. The traditions of the firm describe the humble beginning of what has since become a manufacture of some importance. It is related that at Duke street the blast for the cupola in melting the iron was got from a bellows worked by two men, and that the machinery was turned by horse power. Also that when Mr. Izon removed to West Bromwich he brought only seven or eight workmen with him, and that even this small band was looked upon with such distrust by the inhabitants of that then rural district as to be refused lodging, so that Mr. Izon had to buy or build cottages for his workmen. Numerous anecdotes are current in the trade, all of which point to the fact of this manufacture having been begun and conducted on the most primitive scale by those who were the first to engage in it. It is stated on trustworthy authority that iron for making hollow-ware was melted in a pot furnace by a competitor of Messrs. Izon & Co., about the year 1800.

The first improvement to be mentioned is one in the annealing, a process necessary to soften the cast iron before it can be turned bright in a lathe, preparatory to tinning. The method first practiced was very rude and ineffectual. The ware was packed in strong iron pots or pans, was piled up in the open air on a stage constructed of strong iron gratings placed side by side and end to end to any required extent. The whole was then covered over with coke, and the interstices, as well within the pans as without, were filled up with coal dust, to prevent as much as possible the access of air to the heated ware. The coke was then fired, and the pile kept at a red heat for about 24 hours. The absence of means for retaining and regulating the heat employed—in short, of conducting the operation safely and economically—is evident. Mr. Archibald Kenrick, who began to make articles of cast ironmongery at West Bromwich in 1791, and hollow-ware in 1805, was the first to remedy these defects by building an annealing oven. The annealing oven, as it was first constructed and afterward improved at Mr. Kenrick's works, is an arched chamber, lined with bricks of Stourbridge fire-clay, 22 feet long, 11 feet 6 inches wide and 7 feet 6 inches high; it has a fire-place in the middle, 5 feet wide, extending the whole length of the oven; it has flues in the walls and roof opening into the oven and communicating with a stack high enough to cause a strong draught, which is moderated as required by means of dampers. Thick iron pans to hold the ware, 3 feet 8 inches high and 2 feet 4 inches in diameter, are placed on each side of the fire-place, the flame and hot air from which envelope them completely in passing to the flues. Formerly, when the ware was sufficiently softened, the fire was allowed to burn out and the oven gradually to cool. There were two drawbacks to the perfect success of this method, viz., the time occupied and the waste of heat consequent on lowering the temperature of the oven to a point at which a workman could enter it and empty the pans. Both these defects were removed by the simple contrivance of placing the pans containing the ware on carriages, and running these in and out of the oven on an iron tramway. This last improvement, it is only justice to state, was the invention of an ingenious bricklayer, named Moses Calloway. It dates from about 1817; the brick oven from 1807.

Mr. Kenrick improved the appearance of tinned hollow-ware by attention to the finish, and by substituting a stove-dried varnish for the black lead which had before been used as an outside coating. He also was the first to make saucepans with a rim or head round the top, an improvement claimed in Taylor's specification, but which had never been carried out—probably on account of additional difficulty in casting.

In 1815 Mr. Kenrick patented certain improvements in cast iron coffee mills, which gave him a great name, and eventually enabled him to obtain the largest trade in this article.

American Stamping Machinery for Australia.—During the past year or two the canning business has become an important industry in Australia, and large quantities of both fruit and meats are put up in this way annually. To meet the demand an important business in the manufacture of cans has sprung up, and we are gratified to learn that the Ferracute Machine Company have lately shipped a large number of power presses and dies to a tinware manufacturer in South Australia. No such presses are made in the world as can be had here, and if foreign manufacturers know as well how to use them as do those of this country, we shall soon find them in general request abroad.

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Price lists and information furnished on application.

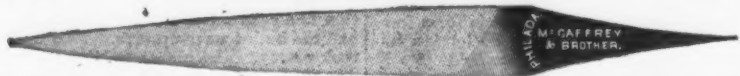
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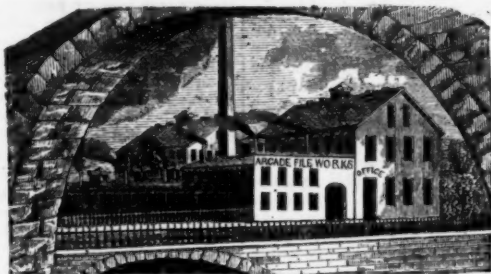
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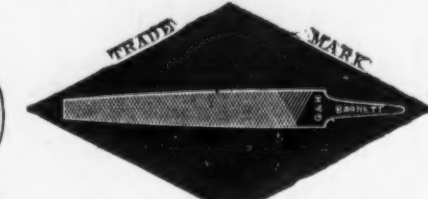
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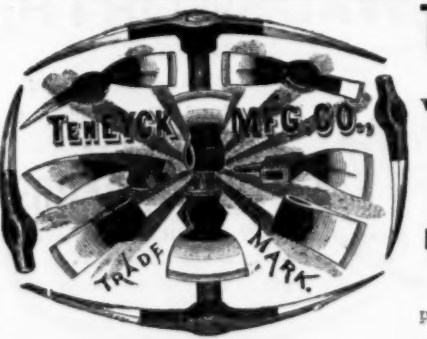


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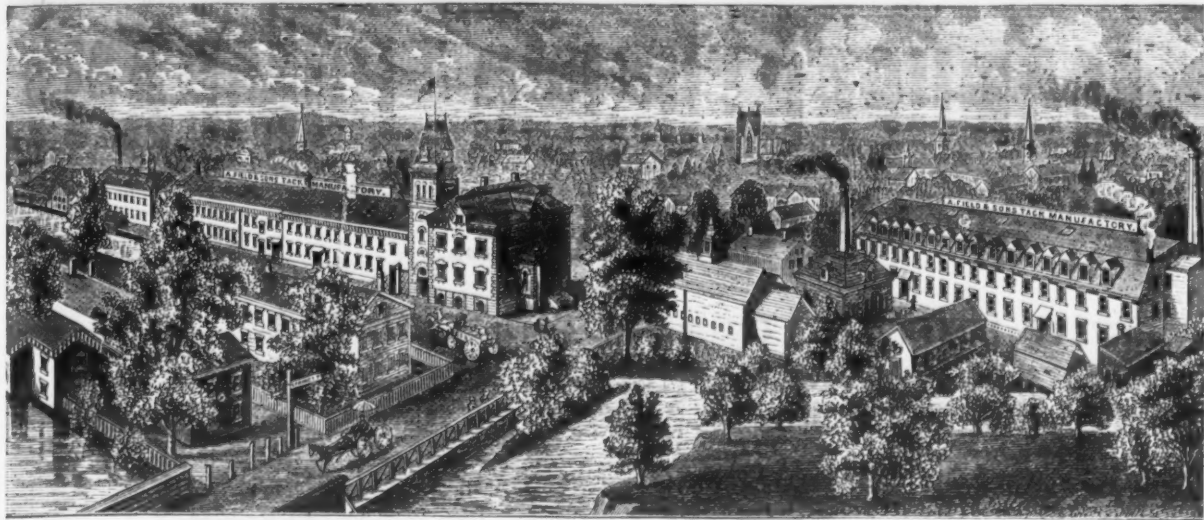
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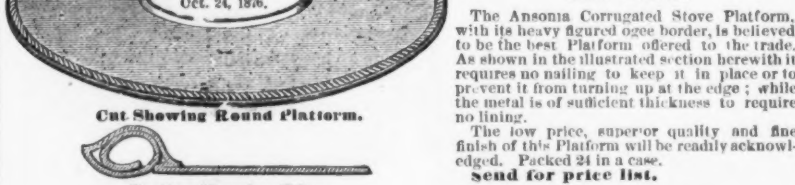
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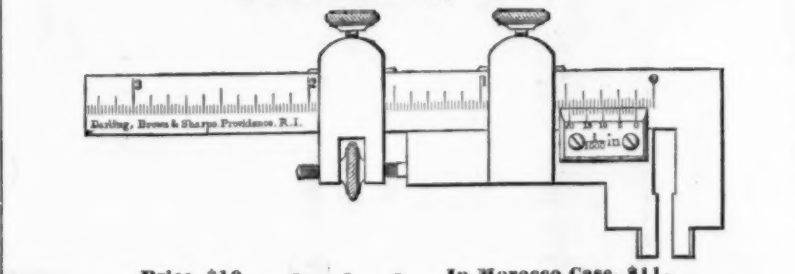
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IMPROVED
POCKET VERNIER CALIPER,
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Price, \$10. In Morocco Case, \$11.
 The above cut is a fac-simile of one side of our hardened Cast Steel Improved Vernier Caliper, a light, convenient and valuable instrument for machinists' and tool makers' use in obtaining correct measurements. The side represented above is graduated upon the bar to inches and fortieths of an inch, and by the aid of a Vernier is read to one-thousandths of an inch. The opposite side is graduated to inches and sixtieths of an inch. The outside of the jaws are of suitable form for taking inside measurements and when the jaws are closed measure up one-thousandths of an inch in diameter. This caliper will measure one inch and eleven-sixteenths, outside diameter, when the jaws are open full size.
 FRENCH MEASUREMENTS.
 These instruments can be furnished with millimetres (in the place of sixty-fourths of an inch), and provided with a vernier to read to one-fortieth of a millimetre.

The Status of the Greenback.

To the Editor of The Iron Age—DEAR SIR: The number of letters of inquiry and suggestion I have received from readers of The Iron Age since you were kind enough to lay before them my paper on "The Authors and Causes of the Financial Depression," is my justification for appealing to you for the privilege of again communicating with them. Surprise is expressed by one of your readers that the support of a measure which had been so earnestly approved by Secretary Chase and Horace Greeley should have caused papers like the New York Tribune, the paper Mr. Greeley founded, its namesake of Chicago and the Cincinnati Commercial to brand me as a lunatic and to make me the object of almost universal derision and caricature, as it had done.

In common with your readers you will probably be surprised to learn that Secretary Sherman, then Senator from Ohio, was among the earliest and ablest advocates of the convertible bond theory; and as he thus held views more in accordance with the then prevalent financial opinions than the late Wm. Pitt Fessenden, was made to displace him from the chairmanship of the Finance Committee of the Senate. Senator Sherman in supporting the measure appealed, as you will see by the following extract from his speech of February 27, 1868, to right and duty as well as to expediency:

"I desire now to make a few observations in regard to the sections of the bill relating to the United States notes; and these I consider as vitally important. We propose to restore to the United States note the right to be funded at the pleasure of the holder into the new bonds whenever he desires. There is more ground of discontent and more real discontent among the people of this country because of the discrimination made between the bond holder and the holder of the greenback than from any other cause. You compel every citizen of this country to take the greenback as money, willing or unwilling. It is the measure of the value of his labor, and yet it has no purchasable power except the hope that in some future time the United States will redeem it. It may be forced upon another man in payment of a debt; it may be applied to pay taxes, but it cannot be converted into income except at a discount.

"A man cannot take United States notes payable on demand to any broker and receive in exchange any form of security issued by the United States. There is a wide discrimination made between the bond holder and the note holder, which gives rise to popular clamor and is the cause of a great deal of just complaint. In 1863 we were compelled for wise purposes to take away the right of the holder of the greenback to fund it, because we wished then to force our loans upon the market, and while that right was outstanding we could not do it. Now that the war is over, that the whole process of funding is intended to be voluntary at the discretion of the note holder, we ought promptly to restore this right to allow the note to be converted at any time into some kind of bond; and we propose, also, to allow the bond to be converted into notes, keeping within the limits of notes fixed by law. Then there is no discrimination; the bond holder and the note holder are both public creditors; both depend upon the public faith. The note holder may go to the Treasury of the United States and demand his bond; the bond holder may go also and demand his note. They are put on a basis of equality. This destroys all speculation in government securities. Both will then stand on the same footing, and both will be of equal value. The note holder may at his option draw interest in gold by converting it into bonds, and the popular cry of demagogues, that we have provided gold for the bond holder and notes for the people, will be silent.

"And, sir, there is now no reason why the note issued to the laboring man should be less valuable than any other form of government security. It makes one of those salient points before a popular audience just and correct, which is the cause of complaint, and will be until it is removed. An important effect of this provision will be to furnish money to redeem the bonds or any other securities that offer, and without resorting to a sale of bonds. I do not propose, nor do the committee contemplate, the issue of any new greenbacks. We suppose that the process of funding these notes, they pouring into the treasury, will furnish ample means to redeem all the outstanding bonds and securities as they become redeemable. I have no doubt the same process will go on here that occurred in Europe—a very small amount of money will pay a large amount of bonds. The mass of the bonds will be exchanged without money. The transactions paid by money, compared with the transactions paid by checks and other forms of paper, are as one to a thousand. The daily balances in the exchanges in the New York clearing house amount to many millions, and yet the amount of currency to pay these balances is often less than 1 per cent. of their nominal amount. Other reasons may be given for the new feature of this bill, giving the holder of these bonds the right to convert them into notes. This is indispensably necessary to guard against sudden contraction and panic. There are times when the notes will float into bonds so rapidly as to contract the currency, and thus derange business and prevent the movement of crops. This privilege will give flexibility and movement to the currency of the country. Every exchange will be a benefit to the government. If the holder of a government security bearing interest surrenders it to the treasury for a note without interest, the United States saves the interest. If, on the contrary, the notes are funded for a bond, the notes may be used in the redemption of other bonds bearing a higher rate of interest. If the money market becomes stringent, if currency becomes scarce, the holder may be willing to surrender his bond, bearing 5 per cent. interest in gold, in order to get currency with which to pay his debts, and why not give him that privilege? It is a benefit to the United States, and it is the only mode by which, during the suspension of specie payments, we may make a flexible currency.

And, sir, this loan will be the great saving

fund of the people of the United States. Every man having money for a time will float it into these ten-forty bonds, and while we have the money we shall pay off bonds having a higher rate of interest. When he desires it again he can come back and get the bond, and so this operation may be carried on with perfect safety. Now the deposits in the savings banks amount to over \$500,000,000. Why should not this money be deposited in the treasury? Why should not these little streams of the savings of the laboring man help to float the public credit? The government of the United States ought not to feel too high to acknowledge the services of such a fund. They will be useful. They will enable the depositor to get the full value of his money. Now he deposits in savings banks, where he gets four or five per cent interest in paper money. Under this provision he may put his money in these bonds, and the money thus deposited will enable the government to pay off bonds bearing a higher rate of interest. In every view we could take of this proposition, after the most ample consideration, we [the Finance Committee] thought it was a wise provision, and would work well. The trouble and cost of printing these bonds and exchanging them one for another, being carried on at the treasury department or at the depositaries, or other proper places of exchange, will be done without cost, except that of printing. It is purely voluntary, and will be adapted to the wants of trade. It will tend to give increased value to the United States notes, and my firm conviction is that under the process both notes and bonds will gradually rise, step by step, until they reach the standard of gold, and then the whole process ceases, according to the provisions of the bill. I look upon this provision as the most rapid way to specie payments."

These were not casual or hasty utterances. They were made in the course of a two hours' speech in support of a bill reported from the committee; and, inasmuch as Mr. Sherman was interrupted with questions (not, however, in this part of the speech), it was withheld for several days for revision and appears in the appendix to the Congressional Globe, second session 40th Congress, pages 187 and 188.

Are the American people ready to believe that Chase and Greeley in their very prime of intellectual vigor were lunatics, and that he who now administers with such terribly destructive power the finances of this government had, before the opening of 1868, been bereft of reason? Or, in deference to the memories of the great dead and respect to the most potent living citizen of the republic, will they cease to brand the humble disciple of these men as one fit for "a strait jacket," and who requires "bladders of ice about his fevered temples" when he travels? Should the organs of the contractionists, who have treated me with such want of candor, in this connection invite attention to the fact that Senator Sherman spoke of gold interest, those who have heard me speak on the subject or read my writings will bear witness that I have always said if it were deemed preferable to make the interest payable in gold, so be it; but, as my object was to diminish the difference between our paper and gold, I preferred to add a new use to the paper dollar, and withdraw one from the commodity which had long since ceased to circulate as money in our country. Hoping you will pardon this liberty, I remain, Yours, very truly,

WM. D. KELLEY.

The I. X. L. Alarm Till and Lock.

The necessity for an alarm lock for tills or cash drawers has long been felt. Those in use have been generally made a part of the drawer itself. The I. X. L. Alarm Lock is made complete in itself, and ready for attachment to any drawer. In this lock the key is of peculiar shape and is used as a knob by which to open the drawer after it is unlocked. When the marked side of the key is turned toward the right the drawer can be opened and shut noiselessly, but when in this position, if the key is removed from the lock the drawer cannot then be opened without sounding the alarm, or if the key is turned to the left the drawer cannot be opened without again turning the key, which then sounds the alarm. When set it cannot be unlocked without giving the alarm. The key is of a peculiar pattern, and no ordinary key will open the lock. The money or cash drawer has 16 compartments for bills of the different denominations and coins now used. A large number of compartments are possible because of the very small space occupied by the lock, which is only 6 1/2 inches long, 1 1/2 thick and, measured with the alarm bell, only 3 inches deep. The lock, which is sold separately from the drawer, can be applied to any drawer in a few minutes and in almost any desired position. The lock and till were patented by A. Rosenfield, the manufacturer, July 31, 1877, who is introducing them to the trade.

Recent Discoveries in the "Land of Midian."—A correspondent of the Times, writing from Alexandria, informs the public that Capt. Burton, the African traveler, has made a "find" of unusual interest. At the request of the Khedive he has visited the "Land of Midian," the desolate region on the eastern side of the Gulf of Akabah, the easternmost of the two long and narrow estuaries in which the Red Sea ends. Accompanied by M. George Marie, a French engineer, Capt. Burton landed in Midian on the 2d of April, and in an exploration of some weeks explored a region full of ruined towns, built of solid masonry, with made roads, aqueducts five miles long, artificial lakes and massive fortresses, all marking a wealthy and powerful people. Their wealth was based on mining operations, and Capt. Burton reports the existence of gold, silver, tin, antimony and turquoise mines. The auriferous region is extensive; indeed, the discoverer believes he has opened up a California, and the Khedive proposes to have the country worked by European capitalists. It will be remembered that in the Bible Midian is always described as a land full of metals, especially gold, silver and lead. It is more than probable that Solomon's Ophir was situated there, as the small ships in which he imported gold, ivory and peacocks were launched at the head of the Red Sea. Midian is part of the Egyptian Viceroyalty.

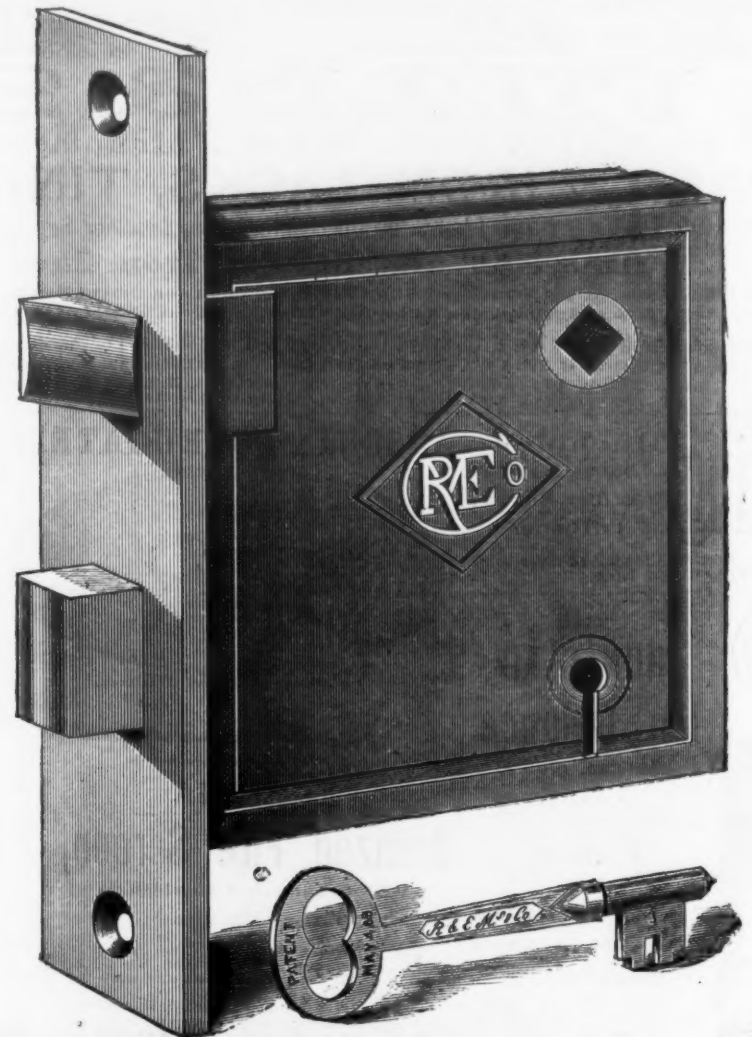
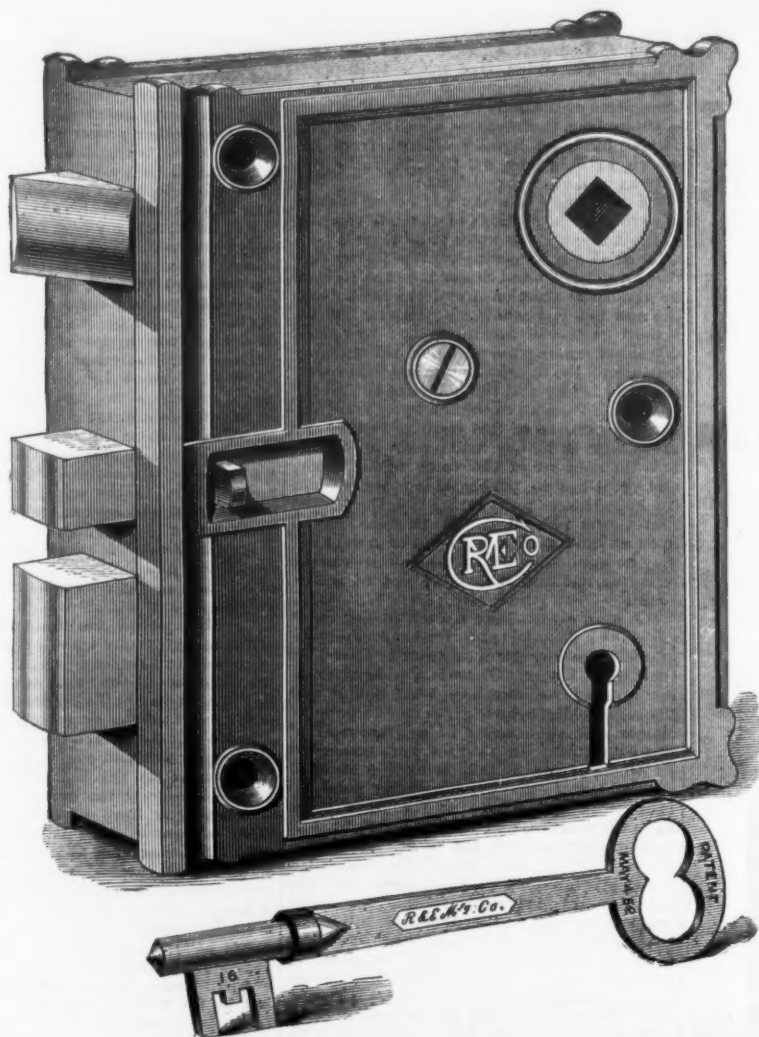
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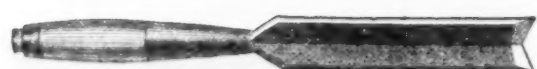
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AMERICAN TABLE CUTLERY, BUTCHER KNIVES, &c.
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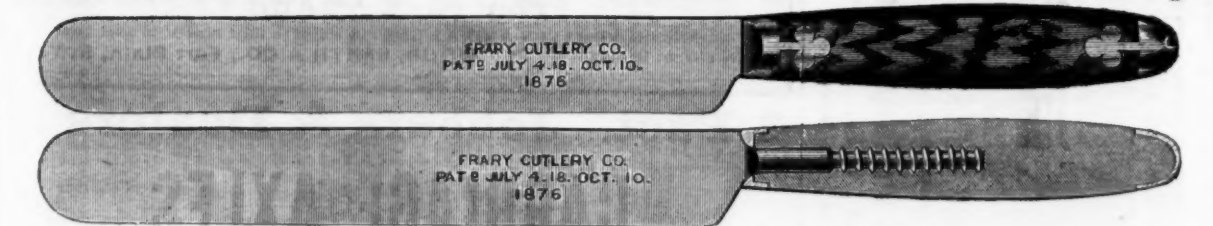
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Manufacturers of all kinds of Table Cutlery.



The above illustrations represent their New Patent Screw Tang Lock Fast Solid Handle Knife.
There is no question but that a solid handle knife is much more preferable than a scale tang. The great objection to their use hitherto is, that no solid wood handle has been placed on the market with the handle properly secured—no handle put on with cement will stand the wear and tear of every day usage. The cement will expand and contract with the action of heat and cold, and become loose, crack and come off, causing great prejudice against their use. This objection is overcome in our patent screw tang. A wood screw is welded to the tang of the knife or fork, and screwed firmly and securely in the handle and locked there by the bolsters, making a very strong and handsome knife, which we warrant never to get loose, crack or come off. We manufacture a large variety of patterns, both Table, Butcher and Carvers, and furnish the patent handle nearly as low as the scale tang. We are prepared to furnish this line of goods, together with the scale tang and iron handle, very promptly, and very respectfully invite the attention of the trade.

SILVER PLATED SOLID STEEL HANDLE KNIVES.
We guarantee 12 dwts. of fine silver on each dozen of Table or Medium Knives. All our Spoons, Forks, &c., made of 18 percent. Nickel Silver. We warrant our extra plate
On Tea Spoons..... 2 1/2 ounces per gross.
" Dessert Spoons..... 3 1/2 " "
" Table Spoons..... 5 " "
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" Medium Forks..... 5 " "
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MANUFACTURERS OF SUPERIOR
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AARON BURKINSHAW,
Manufacturer of Pen and Pocket Cutlery, Pepperell, Mass.
My Blades are forged by hand from the best Cast Steel, and warrant
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Young's Patent Folding Scissors.

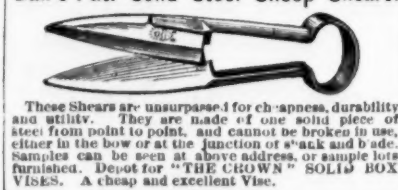


Fac simile of the small size.
These Scissors are made of the very best steel, nickel plated, and so constructed that they can be readily folded and carried in the pocket without injury to the garments. A sample pair will be sent by mail, to the trade only, upon receipt of the retail price, namely:
For small size, either blunt or pointed..... \$1.00
Large size, pointed or half pointed..... 1.50
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MARX BROS., Proprietors,
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ALFRED H. HILDICK,
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Ball's Pat. Solid Steel Sheep Shears.



These Shears are unsurpassed for cheapness, durability and utility. They are made of one solid piece of steel from point to point, and cannot be broken in use, either in the bow or at the junction of neck and blade. Samples can be sent at above address, or sample box furnished. Depot for "THE CROWN" SOLID BOX VISES. A cheap and excellent Vice.

A SCREW BLIND FAST.
Operates without a Spring,
Never gets out of order.

THE NORTHRUP WINDOW SPRING
Best Sash Lock and Supporter in use. More satisfactory than cords and weights, and much less expensive. Send for circular. Samples in working models sent, prepaid, on receipt of 30 cents.

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AMERICAN SLEIGH AND CARRIAGE IRON CO
BOSTON MASS.

Price, \$4.00 per gross; one sample by mail, 10 cents; one each size (three sizes) by mail, 25 cents; one dozen by mail, 60 cents. For sale by wholesale dealers in Boston, New York, Philadelphia, Chicago and St. Louis.

A New and Terrible Weapon.

A few days ago Captain William Gardner gave an exhibition of a new arm of his invention to the officers of the United States Navy stationed at the Newport Torpedo Station. This arm is a little instrument, about the size of an ordinary musket, easily carried on a man's shoulder, as destructive as the Gatling gun, more so than the French mitrailleuse and equal to three field cannon when firing grape and canister. In reply to a question as to what the special advantages of this gun are over other firearms now in use, the inventor replied: "Considerable actual service, a long time spent in Europe carefully studying on the mitrailleuse and the Gatling gun, their uses and defects, and much experience in inventing other arms convinced me that the ideal firearm was yet to be invented. The liability of these arms to be most of the time out of order, their weight, their derangement by transportation, the complicated and frail nature of their mechanism, their clogging by corrosion and their many other defects encouraged me to attempt the invention of this weapon. The problem was to produce an arm of equal or greater efficiency, of much greater strength and durability, not at all liable to be deranged by moisture, dust or long-continued firing, easily comprehended and manipulated by the common soldier, and next to impossible to get out of order even when exposed to the roughest usage of actual service. In one word, I aimed at efficiency, strength and lightness." The gun has but one barrel, which is about three times as strong as those ordinarily used for similar caliber. The mechanism is all contained in a little brass box attached to the rear end of the barrel, the dimensions of which are but 13 inches in length, 5 in depth and 2 1/2 in thickness. In addition to this there is a little crank at the side of the box, by which the power is applied, and a hopper on top, from which an inexhaustible supply of cartridges is kept up. Two men of less than ordinary intelligence can maintain a continuous fire at the rate of 200 shots per minute for any length of time without fear of fouling or derangement of parts by heat or otherwise. The manipulation is so easy that the crank may be turned continuously by the little finger. The arrangement for supplying cartridges is so effective that one man can supply them faster than they can be fired. The gun can be fired equally well at an elevation of 45 deg, and at a depression of 45 deg, and also when tilted sideways at almost any angle, advantages which no other firearm possesses. Mr. Gardner has devised means of transportation for every contingency of land service, both for the gun and the necessary ammunition; also suitable mountings for every form of land and sea service. He has also given tactics for its use which were explained by him, but no opportunity was offered to illustrate them. The gun, weighing but 40 pounds, and having fewer pieces than a Remington rifle and being about the size of an ordinary musket, its performances strike the observer with amazement and justify one in the belief that it will work a revolution in modern warfare.

A Suggestive Table of Wages.—The New Haven Palladium says: The following table is taken from a bill of items recently filed in the city court in a suit brought by a journeyman carpenter for a balance claimed to be due on an account running from March 1, 1859, to October 1, 1876. It represents the market and agreed wages per day of a journeyman carpenter in this city at the various periods indicated. A gentleman looking at it said it illustrated the rise and fall of the greenback empire. It will be noticed that wages reached their lowest point in the first winter of the war, did not rise above two dollars per day until March 1, 1863, and reached their highest point May 1, 1868. The table closes October 1, 1876; but if continued until to-day wages would probably be placed at two dollars per day:

March 1, 1859, to November 1, 1859.....	\$1.75
December 1, 1859, to March 1, 1860.....	1.50
March 1, 1860, to November 1, 1860.....	1.75
December 1, 1860, to March 1, 1861.....	1.50
March 1, 1861, to September 1, 1861.....	1.75
September 1, 1861, to December 1, 1861.....	1.50
December 1, 1861, to March 1, 1862.....	1.25
March 1, 1862, to November 1, 1862.....	1.75
December 1, 1862, to March 1, 1863.....	2.00
March 1, 1863, to March 1, 1864.....	2.50
March 1, 1864, to March 1, 1865.....	3.00
March 1, 1865, to September 1, 1865.....	3.25
September 1, 1865, to December 1, 1865.....	3.50
December 1, 1865, to March 1, 1866.....	3.00
March 1, 1866, to March 1, 1867.....	3.00
March 1, 1867, to September 1, 1867.....	3.25
September 1, 1867, to December 1, 1867.....	3.50
December 1, 1867, to March 1, 1868.....	3.00
March 1, 1868, to March 1, 1869.....	3.50
March 1, 1869, to December 1, 1869.....	3.50
December 1, 1869, to March 1, 1870.....	3.00
March 1, 1870, to March 1, 1871.....	3.50
March 1, 1871, to December 1, 1871.....	3.50
December 1, 1871, to January 1, 1872.....	3.00
January 1, 1872, to February 1, 1873.....	3.75
February 1, 1873, to October 1, 1876.....	2.50

A New Friction Brake.—The New Haven, Conn., Journal thus describes the Richard's friction brake which is being tried on the Naugatuck Railway: The brake is being applied under the supervision of J. E. Richard, superintendent. It is connected with the driving-wheels of the locomotive, and the engineer operates it by a lever. A chain, bound around a drum, passes from it under the tender, then under all the cars of which the train may be composed to the rear one. At the end of it it passes around a "shive" or pulley, back to the center of the car, where it is worked by springs that contract when the brake is put in operation; beneath each car is the same contrivance, which connects the chain as it returns to the engine. The brake first operates on the rear car, and the action being continuous and instantaneous the train is suddenly stopped without concussion, thus preventing any jarring. The cars are coupled with the duplex safety coupler, and should a car jump the track, or the train be divided, the brake is operated by the coupler, the car becomes uncoupled, steam is shut off by the action of the brake, which also stops the movement of the driving-wheels, and the train is stopped instantly. The brake can also be applied by the conductor from any part of the train.

With reference to the discussion regarding the normal presence of copper and zinc in the bodies of wild as well as of domestic animals, M. M. Raoult and H. Breton say that for a long time what has recently been apparently established beyond the possibility of question has been recognized by toxicologists.

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The Iron Age.

New York, Thursday, August 30, 1877.

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JAMES C. RAYLES . . . Editor.
JOHN S. KING . . . Business Manager.

RATES OF SUBSCRIPTION, INCLUDING POSTAGE.

IN THE UNITED STATES, BRITISH AMERICA AND SANDWICH ISLANDS.

Weekly Edition . . . \$4.50 a year.
Issued every THURSDAY morning.

Semi-Monthly Edition . . . \$2.50 a year.
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Monthly Edition . . . \$1.15 a year.
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ADVERTISING.

One square (12 lines, one inch), one insertion, \$2.50; one month, \$7.50; three months, \$15.00; six months, \$25.00; one year, \$40.00; payable in advance.

DAVID WILLIAMS, Publisher,
83 Reade Street, New York.

WESTERN OFFICE.

77 Fourth Avenue, Pittsburgh.
JOS. D. WELLS, Manager and Associate Editor.

PHILADELPHIA OFFICE.

220 South Fourth Street.
THOS. ROBERTSON, Manager.

BRITISH AGENCY.

The publishers of *The Iron Age*, 44a Cannon Street, London, England, will receive orders for subscriptions and advertisements on our regular terms.

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Convict Labor.

The question whether it is right for the State to lease the labor of the convicts in its prisons to contractors who will sell the products of such labor in competition with that of honest workmen, seems to possess a much greater interest for a large class of people than its economic importance warrants. Almost every week we are in receipt of letters from correspondents claiming to be workmen, asking us to denounce the employment of convict labor as a crime against society and an outrage on honest people who have to support families while competing with labor which costs the contractor from forty cents to a dollar a day.

That we are compelled to consider most of these communications to the waste basket is due to the fact that we fail to see in them anything which would justify their publication. Once in a while, however, we get a letter on this subject which merits consideration. One just received incloses a slip cut from another journal, the name of which is not given, and requests us to print it. As it affords an excellent basis for a brief discussion of the subject we make room for it:

In a very short time a Legislative committee will convene at Lancaster to take testimony pro and con, of the expediency of hiring out the convicts by contract to manufacturers. This experiment has been tried in Ohio, and one of its effects has been a clamor among the workmen in that State to have the system abolished. Recently in New York State a prominent stove firm made a contract with the State for the convicts' labor at forty cents per day each. Now, it is well understood that this firm can make their stoves at a less price than their competitors who hire honest labor, and experience teaches us that in times of depression and excessive competition manufacturers are obliged to sell at very small margins. The prison firms can work on and always underbid others, and establish a precedent in prices, and the other makers have no recourse to meet this competition but to reduce the wages of their employees. It is understood that one such firm cannot supply the whole country, but any large quantity of goods placed on the market at a low price is bound to demoralize the whole trade. At the rate the prisons are filling up they will gradually become a vast manufacturing monopoly. The taxpayers do not gain anything by the money saved to the State. When convicts are sent to prison it should be for punishment, and to keep a prisoner in idleness is a severe punishment. They will be apt to keep clear of it after an experience. As the system is now, the convicts have their minds and hands employed, and do not feel the effects of the punishment, other than the disgrace of being there. Upon the expiration of their term they are sent out as skilled mechanics, thus placing them above common labor, and giving them an advantage over our young men who are endeavoring to secure positions to learn trades and cannot succeed. There are thousands of idle young men who would gladly learn a trade if they could but get the opportunity. This idle class goes far to make up our future criminals. Our laboring men cannot be assisted by charity and donations; they must have work. Now the convict labor system cannot be held responsible for all their ills, but it has had the effect of depressing wages in many trades, closing workshops, and made bankrupts of many manufacturers. Manufacturers in this county should meet the committee when in session in Lancaster, and protest against Pennsylvania taking the sad mistake of her sister States in degrading honest labor by competition with convict labor.

We have here the popular argument against the useful employment of convict labor expressed in few words. That it is full of errors and misconceptions is not to be wondered at. We will endeavor to point out a few of these. In the first place, the instances in which the employment of convict labor has been profitable to the contractors are exceptional. In this State a majority of those who have made the experiment have been ruined by it, while the successes are in no one instance as great as have been made in individual instances by other means. That "a prominent stove firm" have contracted for labor in Sing Sing prison is true, but we question if any competing house will admit that stoves made in prison cost enough less than those made outside to give the contracting firm an important advantage. Prison contractors who have tried to underbid others have usually failed, and we could name half a dozen instances in which large sums have been lost in this way. We have no doubt that Messrs. Perry & Co. will succeed in making their contract fairly profitable, but we doubt if they expect more than this themselves, and it should be remembered that they attained a conspicuous success before becoming prison contractors. That the product of prison foundries will demoralize the market is highly improbable. There is nothing in past experience to warrant such a fear.

That our prisons will ever become "a vast manufacturing monopoly" is about as probable as that our friends the communists will be able to convince the people that "property is robbery." Among those who go to prison the proportion of skilled mechanics is very small. Before a convict can be profitably employed he must be taught a trade, and unless he is serving out a long sentence, he will probably be discharged before he has fairly learned it. The contractor who is at the expense of teaching him often receives but little benefit from his skill when he has acquired it. A prison gang is constantly changing. Some die, some are discharged and some pardoned, and their places must be filled by green hands. Obviously, therefore, prison labor can only be profitably employed on coarse work requiring but little skill. That the taxpayer gains nothing from making the convict self-supporting is so evident an absurdity that we will not stop to refute it with facts and figures.

We now come to the most serious of the many errors of the argument we have quoted, namely, that the object of the imprisonment of criminals is punishment. Its sole object is reform. The punishment of crime does more harm than good unless by it we can reform the criminal. If it were not so the rack, the whipping post, the boot, the thumb screw and the many other instruments of torture used for punishment in the middle ages would still be found in our prisons. With a higher civilization we have learned that the prisons to be useful to

society must be reformatories. If during the time of a convict's incarceration we can teach him a trade, we do much toward reforming him by giving him the means of making an honest living if he wants to. Confinement in idleness is not reformatory in its influence. It only makes men beasts. That the education and reformation of criminals results in great practical benefit to society, the records of the Prison Association of New York clearly show; that the system works injustice in any individual case we do not believe. No young man who wanted to learn a trade was ever deterred from so doing, and from working at it when he had learned it, by competition coming from within the walls of our State prisons. The same is true of the reckless generalization with which the writer concludes. It has not depressed wages in many trades, it has not closed workshops nor made bankrupts of many manufacturers. It is simply a great scarecrow which demagogues make use of and at which timid workmen are frightened without cause.

For our own part, we believe it is not only the right but the duty of every State to make its prisons great industrial establishments. Every prisoner should be compelled to work at whatever he can do best. If his term is short or long it should be his lot to earn by the sweat of his brow the food, clothing and shelter which the State provides. When he has learned how to earn them, and has come to a realization of the fact that it is easier and more comfortable, as well as more honorable, to work for his living out of prison than in it, his reform is half accomplished. He goes into prison a dangerous nuisance, who must be removed from association with his fellow men for their protection; he comes out a useful member of society, with a trade and an experience which is likely to deter him from again putting himself under the ban of the law. Deny him the means of reforming and it would be more merciful, as well as more reasonable, to hang him at once instead of sending him to jail. When we have any reason to think that the introduction of the industrial system into the prisons of a State is attended with any injury to honest workmen or anything but benefit to society, we shall oppose it as heartily as we now do the effort to make our prisons boarding-houses, in which our criminals can pass their time in comfortable idleness at the expense of the tax-payers.

Latest Import and Export Statistics.

We are indebted to Mr. Edward Young, Chief of the Bureau of Statistics at Washington, for advance sheets of the import and export statistics for the fiscal year ended June 30, 1877, compared with the previous two years, and extract therefrom the figures relating to articles of more immediate interest to our readers:

	1875.	1876.	1877.
Imports.			
Tin.	1,875	1,816	1,704
Zinc.	3,337	3,381	3,704
Copper and manufactures.	57	58	143
Iron and steel and manufactures.	18,476	13,492	9,571
Lead and manufactures.	1,450	998	749
Quicksilver.	13,018	10,098	9,790
Resins and manufactures.	1,077	1,740	1,677
Coal.	1,077	1,740	1,677
Fire arms and accoutrements.	1,799	1,668	1,776
Ordinance stores.	1,799	1,668	1,776
Manufactures of metals.	1,875	1,816	1,704
Total.	38,956	29,651	25,503

While the importation of the goods above named has decreased in a remarkable manner, the export has been more steady. It will be observed that the falling off in the value of tin, zinc, iron and steel, as well as tin plates has been heavy, partly because of diminished quantities, as in the case of zinc and lead, and partly because of the decline in values. Of ordinance stores we shipped more than five times the quantity sent in 1875. This, we presume, is due to the large demand from Turkey in anticipation of the present war.

	1875.	1876.	1877.
Exports.			
Wool.	1,771	2,385	2,338
Flax.	1,112	1,060	1,243
Hemp and manufactures.	3,490	2,339	1,973
Butter, tallow, &c.	20,897	15,331	10,699
Leather and manufactures.	10,461	8,494	8,265
India rubber and manufactures.	4,973	4,064	5,548
Manufactures of wool.	514	490	345
Manufactures of flax.	76	82	97
Manufactures of hemp.	1,243	1,060	1,243
Manufactures of leather.	1,060	82	97
Manufactures of india rubber.	30,679	23,616	16,769
Manufactures of wool, flax, hemp, leather, india rubber, &c.	1,112	1,060	1,243
Total.	49,455	35,896	32,987

The aggregate import of the goods named in the preceding table has been recovering a little; our export has gained considerably, owing to the advance in the price of petroleum. The decreased value of the hide import has been due to the decline in prices; our leather export has remained steady. The decline in our export of agricultural implements is striking, but, on the other hand, American manufactures are becoming more important as an article of export. The import of paints is decreasing, and our exports are not given, although generally quite important. We also miss the export of India rubber goods.

AGGREGATE IMPORT AND EXPORT OF MERCHANDISE.—IN MILLIONS OF DOLLARS.—SPECIE VALUES.

	1875.	1876.	1877.
Imports.	533	461	451
Exports.	499	526	590
Domestic goods.	14	15	23
Foreign goods.	513	541	603
Excess of import.	80	60	58
Excess of export.	51	80	138

The excess of exports over imports, it will be noticed, has rapidly increased during the past few years, and this will probably be still more the case during the current fiscal year.

The proportion which raw material bears to manufactured articles in the foregoing trade movement, the following statistics will show:

RAW MATERIALS.—IN MILLIONS OF DOLLARS.

	1875.	1876.	1877.
Imports.			
Live animals.	2.08	1.75	1.65
Food products.	189.72	175.54	188.65
Leaf tobacco.	3.72	3.71	3.73
Textiles.	20.24	23.59	23.78
Hides and skins.	25.67	19.39	28.53
Metals.	11.22	11.59	12.05
Marble, &c.	2.85	3.68	4.20
Seeds and gums.	1.34	1.22	0.87
Manure.	7.01	4.91	2.79
Coal.	0.53	0.71	0.87
Hay.	1.80	1.61	1.78
Oil.	0.11	0.13	0.12
Ice.	0.21	0.18	0.21
Naval stores.	2.00	2.00	2.35
Oils.	31.90	35.31	64.70
Oilseeds.	5.14	3.77	4.82
Tallow.	5.69	6.73	7.88
Wood and lumber.	7.00	5.42	4.68
Other goods.	9.86	10.04	11.70
Total.	292.03	265.61	282.08
Exports.	8.55	9.96	9.90
Total.	283.48	255.65	272.18

MANUFACTURES.

	1875.	1876.	1877.
Liquors.	9.51	7.75	6.62
Tobacco.	3.14	2.45	2.08
Paintings, paper, b'ks, stationery.	3.97	3.72	2.98
Drugs.	13.22	10.50	11.33
Dry goods.	138.31	115.45	95.40
Clothing, &c.	34.60	25.52	21.48
Crystallized.	2.80	1.72	2.53
China and glass.	10.08	9.11	7.05
Leather and manufactures.	10.76	8.83	8.59
Musical inst.	0.70	0.77	0.59
Ord. stores.	3.26	2.73	3.24
Soap & st'ch.	0.86	1.16	1.75
Sugar & mol.	3.75	6.71	5.18
Spts of turp.	1.02	1.67	2.37
Cars, carriages, &c.	1.18	1.15	1.41
Clocks.	1.22	0.97	1.03
Ag. imp.	2.63	2.26	1.82
Wooden ware.	4.05	3.83	3.66
Vessels.	0.38	0.27	0.30
Other goods.	10.45	6.58	6.47
Total.	240.98	195.13	169.23
Deduct re-exports.	5.61	4.84	3.90
Total.	235.37	190.29	165.33

Taking the three fiscal years together, it will be seen that against an import of \$811,310,000 of raw material we exported \$1,569,880,000, or nearly twice as much, but that against an export of \$217,160,000 of manufactures we imported \$591,990,000, or nearly three times as much. From these statistics it is evident that while our progress in the export of raw produce has been highly satisfactory, that of domestic manufactures increases but slowly, and that we should make strenuous efforts to expand it.

The following shows the relative importance of our leading seaports in the trade movement during the fiscal year ended June 30, 1876:

TRADE MOVEMENT OF LEADING SEAPORTS.—IN THOUSANDS OF DOLLARS.—MIXED VALUES.

	Im-ports.	Ex-ports.	Total.
New York.	311,713	13,868	325,581
Boston.	11,603	334	11,937
San Francisco.	34,414	1,214	35,628
Philadelphia.	24,085	2,913	27,000
Baltimore.	22,341	177	22,518
Savannah.	511	22,682	23,193
Galveston.	1,332	15,345	16,677
Mobile.	1,012	15,157	16,169
Portland, Me.	1,178	481	1,659
Charleston.	486	3,399	3,885
Wilmington, N. C.	94	3,411	3,505
New Haven.	919	2,465	3,384
Richmond.	487	2,748	3,235
Wilmington, Or.	358	2,487	2,845
Providence.	137	2,487	2,624
Other ports & districts.	30,025	1,875	31,900
Total.	476,678	21,270	497,948

It will be observed that more than half the movement is through the port of New York, and that the seven leading ports do 86 per cent. of the whole.

On comparing the amount of tonnage entered at the leading American ports in certain years with that of Montreal, it will be found that our Northern rival has in this respect increased more rapidly than we have:

TONNAGE ENTERED.—IN THOUSANDS OF TONS.

	New York.	Boston.	New Orleans.	San Francisco.	Philadel-phia.	Balti-more.	Montreal.
1853.	1,756	586	21	253	184	119	60
1857.	2,036	711	61	149	189	153	66
1862.	2,510	619	—	282	179	124	260
1867.	2,754	732	254	311	287	304	185
1872.	3,950	861	502	444	418	358	392
1875.	4,421	750	454	434	382	351	642
1875-76.	6,095	16,533	9,085	7,133	6,206	5,809	4,893

Steam Boilers.

It would seem from the treatment which boilers and engines receive at the hands of steam users, that the engine was all important and the boiler of no consequence whatever—a necessary but bulky evil. Until within a few years engineers have somewhat encouraged this idea by largely confining their attention to the economical consumption of steam in the engine, taking it for granted that the boilers were economical steam producers. It not unfrequently happens, however, that no possible economy in the engine is sufficient to make up for the coal wasted in the boiler. The idea that boilers are of little consequence so long as they make steam enough, gives rise to many evils. It explains why they are often put in out-of-the-way holes and corners where inspection is impossible, and where the destructive influences of leaks, dampness, dirt, &c., can work without hindrance. We know of a boiler in this city hidden away in the cellar of a large factory, which was neglected so long that a deposit of mud, ashes, soot, &c., accumulated in the ash pan, flues and tubes, and at last destroyed the draught.

We can hardly explain to the non-professional reader the danger which results from such treatment of a boiler, while the cost to the owner is so large that no professional would dare attempt its computation. Mr. Roper, of Philadelphia, gives some instances of boilers placed in positions where access to any part of them save the fire door was impossible. In such a case accumulations of soot and ashes are sure to clog the tubes, and mud or scale to collect within the boiler. Aside from the danger which follows such neglect, it is bad policy however regarded. Not only is the boiler rapidly destroyed and the danger of an explosion rendered imminent, but steam is generated slowly, the heating surface of the boiler is not efficient, and a large amount of coal is wasted.

Within the past year boilers of considerable size have been found running without steam gauges, and, if we are not very much mistaken, one was found without either safety valve or gauge. Here the neglect became criminal, and it is a wonder that an explosion has not taken place long ago. We believe that in one instance

advice in regard to repairs and management from experts. It often happens that the water of a particular locality favors the formation of scale or mud deposits, or it may be, corrodes the iron. These points the inspector can decide and give the owner hints which could not usually be obtained otherwise, except at considerable expense. We might go on and give the reader an outline of what we may term the duties of steam users to the steam boiler, but this can better be obtained from books upon the subject. We merely wish to urge upon the steam users the necessity of good judgment in the care of steam boilers, and to enforce the idea that the boiler is of quite as much consequence in its way as the engine. We may illustrate the latter point by a little history. A manufacturer not long since built several engines of a particular pattern and fitted them up complete with boilers ready for service. They were all sold and gave good satisfaction, and everyone supposed that they were very economical steam users. They certainly developed large power on a small consumption of coal. One of the engines was sent back to the shop, after a year or more of use, to make an alteration. It was discovered that through a series of mistakes all the engines of that pattern had been sent out with the valves so constructed and set that the steam followed practically through the whole stroke, and yet the large and very efficient boilers had very much more than made up for this fault, and the engines were doing their work in every case with somewhat greater economy than their competitors. It is needless to say that the valves of that engine were at once reset and the others attended to as soon as they could be reached. As might have been expected, there was a great gain, but the lesson taught was one that should not be forgotten. The boiler was large in proportion to the engine, and made an abundance of dry steam with a small expenditure of power, and proved itself the better half of the combination. Here we may suggest that those who purchase boilers should be sure they are large enough. The ratio of three to five is not a bad one for the engine and boiler—that is, five horse-power of boiler for every three horse-power of engine. This makes the boiler cost somewhat more, but the additional expense will probably not, in any ordinary form of boiler, be more than 15 per cent. The saving in fuel, the better and more regular supply of steam and the reduced wear and tear pay for this increase of cost many times over.

It is not to be wondered at that at the present time manufacturers who sell engines and boilers combined are paying more attention to the boiler and leaving the refinements of the engine to others. The consequence is that the cost in coal of small steam powers has probably been reduced two-thirds within ten years, even where the same engine is employed.

The Lake Superior Ore Trade.

The Lake Superior ore trade for this year presents some features that are worthy of note. The most notable is the large increase in the output of the mines. The shipments from the several shipping points for the present season up to August 16, as compared with those of the past two seasons, is as follows:

From where.	1875.	1876.	1877.
From Marquette.....	282,140	266,280	332,452
From Escanaba.....	136,520	203,054	236,516
From L'Anse.....	45,593	46,328	45,818
Total.....	459,163	515,633	614,786

It will be seen that the increase in 1876 over 1875 was 56,470 tons, and of 1877 over 1876 nearly 100,000 tons. Those interested in this ore region explain the increase by saying that it is largely of hematites and from new openings. This may be the fact, and from an inspection of the figures showing the shipments of the several mines, we do not doubt it; but what is the explanation of the fact? Why is it that, with all the conditions that surround the iron trade at present, parties who are in that trade can be found who are willing to invest their capital in these new ventures? Talk with old ore miners, and they declare there is no money in ore at present figures. If we suggest in these columns, in the mildest manner possible and with the utmost diffidence, our opinion that lake ore can be sold at Cleveland at lower prices than at present charged, we are told in no gentle words that we do not know what we are talking about. Perhaps not; but we do know that during the past two years the shipments from the ore region have increased 150,000 tons. Those interested claim that the increase is in low-priced ores, and yet they do not ruin any one. Speaking without the facts in detail before us, we give it as our impression that the failures of ore companies doing business in Lake Superior have been very infrequent during the past five years, and we believe that this trade has suffered less from the panic heretofore than any other department of the iron business.

We believe, and we have substantial grounds for our belief in the balance sheets of ore companies, that the present prices on ore give in most instances a fair profit, and in some a very handsome profit. It would be possible to sell some ores much below the present market prices and still leave a good margin. There are certain mines so situated that they cannot sell at any less, but of the good mines these are the exceptions.

Another fact seems evident: Unless this output is reduced ore will go down in price. The price of the first-class hard ores may

not be lower this year, as there seems to be a demand for all or nearly all of this grade that will be produced; but other ores have already declined, and will go still lower unless production ceases. The operators realize this and are taking steps to reduce. The *Mining Journal* announced a week or two since that "the working forces at nearly all the mines in the district are being materially reduced. The Lake Angelina has discharged one-half its force; the Saginaw has, or soon will, reduce its working force to a maximum of 50 men; in addition to the suspension of mining operations at the Michigamsee, two or three small mines have shut down altogether; and we have it from good authority that two of the leading mines at Ishpeming will shortly dispense with the services of at least 300 men now in their employ."

This is an indication of the alarm and the preparation to avert the threatened danger. While blast furnace men would be glad to have ore at a lower figure, they cannot blame the ore producers for charging all they can get for their product. If manufacturers of pig iron and bar iron, in regulating the price of their products, had shown half the sense ore men have manifested in keeping up the price of ore, our market reports would now be much more agreeable reading.

Judge Kelley on the Greenback.

We call attention to a letter from Hon. Wm. D. Kelley, of Pennsylvania, which we print on another page. It is an almost unnecessary defense of the position taken in his very able article printed in our issue of the 9th inst. That Mr. Kelley is thoroughly and intelligently in earnest in his effort to bring about a reform in the financial policy of the government, no one who knows him can doubt, and we regret that he has thought it necessary to bestow undeserved attention upon the silly chatter of those who find pleasure in caricaturing him as a crazy enthusiast. That he is an enthusiast is true, but no one who has ever known Wm. D. Kelley will question for a moment the thoroughness of his study of financial questions nor the intelligence and moderation with which he advocates what he so conscientiously believes. Even those who think him wrong in his conclusions will do him but scant justice in admitting that few men have ever been more intelligently mistaken, or have reached erroneous conclusions after closer study or a longer experience in the investigation of economic questions.

Reports of the United States Commissioners to the International Exhibition at Vienna, 1873.

IV.

We are devoting a larger space to the report of Professor Thurston than we should have felt justified in giving were it not for the facts that the historical matter and the scientific, though popular, essays on the principles of design and construction of the steam engine and of machinery are of such importance and are so rarely found in publications of this class that we cannot, in simple justice to our readers, allow ourselves to pass over them as cursorily as we should otherwise have done, and that much of the information here given is of that kind which never grows old and is never out of date. It rarely happens that a writer possesses both the ability and the inclination to place before the reader plain, simple statements of the laws and facts which modern science has revealed, and to trace their bearing upon the practical work of the designing engineer and the manufacturer.

One of the most novel and yet most important classes of exhibits at the great world's fair, to which a special chapter is devoted by our author, is that which embraces the various forms of locomotive engines used on the common road. Watt proposed a steam carriage and Murdoch made a working model of the machine as patented by Watt in 1784. Cugnot, fifteen years earlier had, however, actually built and worked a steam carriage which is still preserved in the *Conservatoire des Arts et Metiers* at Paris. It was not until early in the present century, however, that steam was applied with any success in this direction. By the year 1833 a large number were in use in and around London. The introduction of the railroad put a stop to their use for the general transportation of passengers and freight. There are still, however, many traction engines built by Messrs. Aveling & Porter and one or two other British firms which are applied to the haulage of heavy loads on the common road. The author of the report has collated the results of experiments made by Mon. H. Tresca, the distinguished engineer of the French Conservatoire; of M. Serret, M. Carfort, the judges of the British Royal Agricultural Society and by Professor Thurston himself. He gives complete descriptions with illustrations and dimensions of the engines used and the conclusions to which he was led by their trials. He found a 5-ton road locomotive to be capable of turning in a circle of 18 feet radius, of hauling 23,000 pounds up a grade of 533 feet to the mile on a smooth macadamized road, of pulling 63,000 pounds up a hill rising 25 feet to the mile, and of exerting a direct tractive force of about 5000 pounds. He calculated the weight which it might draw on a perfectly level and smooth road at 175,000 pounds. Where circumstances permitted the constant employment of so great power, it was as economical in first cost as horse-power, was not limited in the length of its working day, and its running expenses were but 30 per cent. of the cost of employing horses. Our author is evidently a strong advocate of the introduction of the road engine wherever it is permitted.

The best portable engines at Vienna were in the British section. Of their performance

the writer gives some interesting and very remarkable statistics. By careful designing and the adoption of every expedient which long experience had made them familiar with, the consumption of fuel at trials conducted at the annual shows of the Royal Agricultural Society has been reduced to two and a half pounds per hour and per horse-power in some cases. The engines of Mr. Hoadley, of Lowell, and of the American Engine Company, are referred to by the author as examples of equally good practice in this country. They were not exhibited.

The steam boilers at the Exhibition were not remarkable for either variety or novelty of design. Those of Adamson & Co. were excellent examples of good workmanship. The rivet holes were drilled, the sheets trimmed to size and the edges beveled by planing before fitting up, instead of being chipped by hand after having been riveted up; the flues had welded seams and Galloway tubes were welded in. The Galloway boilers were also well made; the results of a trial of these boilers are given, at which they evaporated 10.82 pounds of cold water per pound of Welsh coal, equivalent to 12.88 from a temperature of 212 deg. No determination was made of the amount of water primed over with the steam, and it is therefore impossible to judge how far this evaporation was actual, and how far apparent. To illustrate the comparative efficiency of the sectional forms of boiler, the author gives an abstract of trials conducted under his own direction, and with exceptionally complete arrangements for determining the amount of priming. They were found to give an effect equivalent to that due to 70 per cent. of the total thermal value of the fuel.

Berryman's very ingenious and effective feed-water heater and other attachments to the steam boiler are described, and the reader is shown how to calculate the gain in economy of fuel which may, in any given case, be expected from their use.

The theory of that wonderful instrument, the Giffard injector, is given very concisely; and the general principles of its action are stated so plainly that the reader cannot fail to comprehend them. For a more extended treatise on this apparatus we would refer our readers to a little volume in Van Nostrand's Science Series. Finally, the principles of steam boiler construction are summarized in two pages, and so completely that no one who is capable of understanding the simple rules given can fail in the attempt to make a boiler that shall do, at least, satisfactory work. Steel of the "mildest" type is recommended as the best material for boiler making, and the author sharply criticizes the practice, common under our present defective laws, of permitting boilers to be used under conditions which are liable to cause disaster. He recommends a factor of safety of at least six in designing, and that the margin between the working pressure and the inspector's test pressure be very greatly increased. Taking up the subject of air and gas engines, our author first shows that the best forms of modern steam engine utilize about 85 per cent. of the heat supplied to them from the boiler in a practically available form, and that we are not, therefore, to expect much more from the common type of steam engine. He considered the adoption of the hot-air engine as probably the most promising of all the methods yet proposed for widening the range of temperature in the effort to increase the economy of heat engines. This class includes, properly, all forms of permanent gas engines. Henderson's theory of the aero-steam engine is given, with estimates of the efficiency to be expected from its use. Brayton's non-explosive gas engine, which our author considers the best form of gas engine yet brought out, is described. At a trial, made by Professor Thurston, this engine gave a horse-power on a consumption of but 32.06 cubic feet of gas per hour and developed its full rated power. The next best gas engine, which is also described, is that of Otto & Langen, which consumed 38.10 cubic feet. At a later trial by M. Tresca, however, the latter consumed very nearly 50 feet. The best performances of the Lenoir and the Hugon engines are given by the author as 70 and 74 feet respectively. The sources of the economy of the best gas engines are stated to be continuous, rather than explosive, combustion of the gases and high piston speed.

Treating of water wheels and other hydraulic motors, the relative cost of water and of steam power is compared. The principles of construction with a view to efficiency are stated, and the exhibits are described. Briefly stated, the principles to be observed in construction are to so design and proportion the apparatus that the water shall enter the wheel without shock, pass through the buckets without becoming broken into eddies, and finally leave it with no more motion than is necessary to enable it to fall clear of the wheel without being struck by the following buckets. The best speed of turbine wheels is usually, approximately, one-half that of the stream as it enters the wheel.

In a short chapter on pumps all of the well-known steam pumps are described, as exhibited at the Exposition, and the construction of the Cameron, the Selden and the Earle pumps illustrate their construction. Probably the most valuable part of this section is the summary of the principles of construction of what our author asserts to be the misnamed class of "centrifugal" pumps, in which the less centrifugal force comes into play the more efficient the pump, usually. It is shown that the form of vane should be trapezoidal in the plane of the axis and a spiral in the plane of the disk. The method of receiving and transmitting the water is subject to the same laws as were shown to govern the action of the turbine. Among others, the great pumps built by Messrs. J. & H. Gwynne & Co. to drain the Ferrara marshes are described. They are centrifugal pumps 5 feet in diameter, mounted in casings 15 feet in diameter, driven by engines having cylinders 28 and 47 inches in diameter, of high and of low pressure cylinders respectively, and furnished with steam from boilers of 750 feet of heating surface. They are expected to raise 2000 tons of water per minute to a height of 12 feet.

Our author devotes 85 pages to the description and criticism of the metal and wood-working machinery of the best of our own

and foreign builders. He states that the principal attraction to the professional visitor was found in the exhibits of Sellers & Co., the Brown & Sharpe Mfg. Co. and the Pratt & Whitney Co., from the United States, of Sharpe, Stewart & Co., Duncomm & Co., and one or two others among the European exhibitors in the department of metal-working machinery, and of B. D. Whitney, Fay & Co. and two or three British firms making wood-working machines. European copies of American machines were seen in all sections of the Exhibition. British and American builders are closely competing, the one excelling in the strength and solidity of their tools, the other in ingenuity and the special adaptation of mechanism to certain kinds of work. Those of our machine builders who are named are, however, not excelled by any foreign makers in any respect. Very complete descriptions are given of the principal exhibits, and a very large number of illustrations distributed through the chapter lend both interest and intelligibility to the text. Our manufacturers and users of wood-working machinery will find some valuable suggestions prompted by a study of the exceptionally complete account of the tools of the British tool makers, Ransome & Co.

In the last chapter of Part I. of the Report we find concise accounts of the textile and miscellaneous machinery exhibited. Almost nothing was sent from the United States that properly falls under this head. The most prominent exhibitors of standard textile machinery were Platt Bros. & Co., and one or two other British firms, and Bode & Co., of Verviers, Belgium. The Avery wool-spinner, invented by Mr. Luther W. Felt, exhibited in the United States section, attracted much attention and very favorable criticism from experts. The independent picker motion of Mr. L. E. Ross, of Providence, R. I., is very highly commended. Of other machinery there was a great variety, and some of the exhibits were of much importance. Sellers' rotary puddling machine is one of these. The steam hammer built by the same firm is described and heartily commended. Hall's and Stephen's vises are well spoken of, and the Billings & Spencer drop forgings are stated to have been excellent specimens of a very important class of work. Massey & Co.'s steam hammers are described in detail, and the somewhat intricate but wonderfully ingenious brush-making machine of Woodbury and the boot-making machines of "down East" firms are given the credit which they so well deserve. The sand blast, West's tire setter, which sets wheel tires cold, Miller's pipe-bending machine and Warth's neat little cloth cutter, and the effective gear-molding machine of Scott are reported upon favorably. The wonderful increase of strength of iron cold rolled by the Lanth process at the American Iron Works, Pittsburgh, is shown, by tabular statements of the results of the experiments of Fairbairn and Wade. This action has been shown by Prof. Thurston to be accompanied by, if not partly due to, a singular elevation of the apparent elastic limit of the metal. The same treatment as applied to gun bronze by General Uchatius, and, still earlier, by Dean, of Boston, is shown to result in a similar and hardly less remarkable improvement of that alloy. Prof. Hartig, a German associate of our author on the international jury, speaks of the American exhibit in this department of machinery as presenting "a true elite of inventors and manufacturers."

Part II. of Thurston's report contains an account of European manufacturing districts, visited by him after his departure from Vienna, and a comparison with the observations made by him on earlier visits. Our readers must consult the report itself to be able to appreciate the amount and value of the statistical and other information thus collected, and especially that relating to Swiss and German manufactures. The immense establishments of Krupp in Prussia, of Cockerill in Belgium, and of Schneider in France, and their products, are described at considerable length. The great iron making districts of Great Britain are described; and considerable space is given to naval architecture, to iron shipbuilding, and to ordnance. Whitworth's method of making "compressed steel" is illustrated, and it is stated that he has made a metal capable of carrying a load of 45 tons per square inch, and of elongating 25 per cent. before breaking. A report on the Whitworth ordnance, which is also here described, was made by Prof. Thurston to the navy department several years ago (1870). It is surprising that no attempts have been made by our government to utilize a method which, as our author states, is "philosophical, mechanical, effective and economical." Referring to the various methods of improving the quality of metals used in ordnance construction, he says: "These experimental investigations and theoretical deductions, of national importance as they are, are of hardly less interest and importance in their bearing on the arts of peace. For many applications in mechanical engineering a material which is of value as a gun metal is also essentially important, and the engineer in general practice watches the progress of improvement in ordnance with scarcely less interest than the engineer whose special work is the manufacture and use of ordnance. Both, also, are equally interested in attempts to introduce materials, like cold-rolled iron, the softer steels, cold-rolled or 'steel,' bronze, phosphor bronze and compressed steel, which give promise of aiding them in their attempts to produce machinery and structures more perfectly combining strength with lightness, or guns which are strong, reliable and efficient. In all directions, the progress of improvement is checked by the attainment of a limit set either by the weakness of the materials of construction or oftener by their deficiency in resilience. The improvement effected by the processes just referred to would seem to be largely due to the reduction of that porosity which is the invariable characteristic of the cast metals as ordinarily produced. The experiments of the writer, and the results of many tests of commercial materials in the Mechanical Laboratory of the Stevens Institute of Technology, indicate that even with the best of ordnance bronze, defects of structure occur which must detract greatly from their value. It would seem probable that solidification under compres-

sion, and other methods of securing density and homogeneity, may prove useful in many cases not yet thus treated."

Foreign Tariffs.

The *British Trade Journal* says: "Mr. Fawcett some time ago moved for a return of the import duties charged on British goods by various foreign states. The Statistical Department of the Board of Trade frequently publishes information of this kind, but seldom in a very accessible form. The return it has made to Mr. Fawcett's motion is, however, very convenient and compendious. It tabulates the various rates and percentages of duty charged on our exports. There are 14 of our principal foreign markets included in the list—Russia, Sweden, Norway, Denmark, Germany, Holland, Belgium, France, Portugal, Spain, Italy, Austria, Turkey and the United States. In glancing over the comparative table we have first to observe how very few articles are free. Russia shows only one, and that is coal. On silk there is a nominal duty of 1 per cent., but everything else which the Russians purchase from us has to pay from 10 to 90 per cent. toward imperial taxation, including the cost of the present war. Our good cousins, the Americans, do not have a single free article of British manufacture. The lowest duty they levy upon us is 14 per cent., and the highest is cent. per cent.—Jewish interest, in short. The largest number of free items appear under the head of Holland. The Dutch take our cottons, linens, silks, worsteds, iron, copper, tanned leather, alkalis, coals and herrings without taxing themselves for them. On cotton the heaviest duties are levied by the United States—from 53 to 85 per cent.; the next highest, Spain, 51 to 64 per cent.; then Russia and Portugal, 23 to 38 per cent. The Belgian duties range from 4 to 19 per cent., the Swedish from 8 to 13 per cent., and nearly all the others are under 10 per cent. Among the most moderate are the Turkish duties, which average less than 7 1/2 per cent. This is the standard duty in the Turkish tariff, there being only two considerable exceptions to it—coals, which are charged 20 per cent., and oil seed 14 per cent. Linens are charged, in the United States, from 35 to 40 per cent.; in Russia, 14 to 35 per cent.; in Portugal, 13 to 31 per cent.; in Sweden, 8 to 12 per cent., and everywhere else under 10 per cent. In woolen goods the range is from a nominal 1/2 per cent. in Germany to 85 per cent. in the United States. On these Russia is content with a levy of 13 per cent. On iron she requires from 17 to 50 per cent., while the United States are not sufficiently protected without from 42 to 83 per cent. British paper has to undergo much harsh treatment at foreign custom houses. The Americans exact from 20 to 35 per cent. upon it, the Russians 53 per cent., the Portuguese 42 per cent., but other foreign buyers tax themselves only about 10 per cent. The article which has the hardest battle to fight in international trade is sugar. It is enormously handicapped in all European tariffs, with the exception of Turkey, which, having no ambition to refine its own sugar, and a large capacity for dispensing with the article, is content with its usual 7.20 per cent. Russia levies a protective duty of 90 per cent., France about the same; the United States, 75 per cent.; Portugal, 85 per cent.; Holland, 70 per cent.; Norway, 60 per cent., and so on down to 34 per cent. (Italy), which is apparently the lowest. Beer follows the fate of sugar as regards international competition. It has to pay 118 per cent. in Portugal, 80 per cent. in Russia, 75 per cent. in the United States, and down in the descending scale to 8 per cent. in Denmark. It may be too early to anticipate the economical effect of the present war, but one broad result needs little foresight to recognize. Whatever portion of the valley of the Danube may pass from under the Turkish to the Russian tariff will have its customs duties increased, on an average, eight-fold."

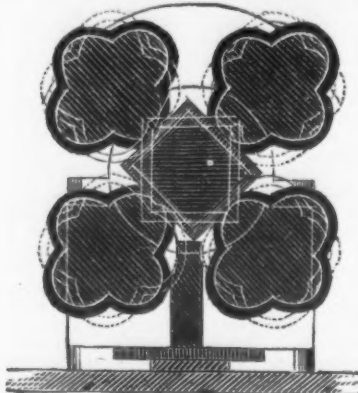
Roofed with Gold.—One of the Philadelphia papers has been investigating the subject of gold in the dirt upon the roof of the Philadelphia mint. Its report we give below, but we are somewhat skeptical in regard to an ounce of gold from four ounces of dirt. That part of the story is somewhat large even though it be 25 years old. "Just twenty-five years ago, when Mr. Eckfeldt was Assayer of the United States Mint in this city, he submitted the dust upon the roof of the building to an assay. The startling result of the curious experiment was that he obtained one ounce of standard gold from three and eight-tenths ounces of dirt. Some of the gold obtained in this singular manner is now exhibited as a curiosity in the office of the Assayer. A few weeks ago Director Pollock ordered the gold mine on the roof to be worked again. With some difficulty this was done in a proper manner and the dirt, dust and deposits of a quarter of a century, to the amount of 1732 pounds, were removed. This has just been tested in the usual way and has yielded 42 ounces of standard gold and 96 1/2 ounces of standard silver, the total value of both being about \$850. On the whole the roof of the mint may be said to contain 'pay dirt.' The roofing of the building is made of asphalt, and as it softens in the sun the little particles of metal come upward in the smoke from the furnaces and, carried out of the windows below by the wind, are lodged on the roof, where they become imbedded and remain until extracted by the assaying process. Every week the floors of the mint are carefully swept, and the accumulations preserved. Once a year, prior to the settlement of accounts, the woodwork of the refining room and the leather gloves of the workmen are burned to ashes. This, together with the year's sweepings, is conveyed to the sweep cellar, where it is ground in a mill and sifted and washed in a machine, the pulverized metal being caught up by mercury. The residue is then dried, barreled and sampled and sold to sweep smelters, who buy it for from fifteen to twenty-five cents a pound, according to the amount of precious metals contained in the samples. So far this year about 260 barrels have been sold, a large proportion of which was purchased by a London firm."

New Patents.

We take the following abstract of new patents, recently issued, from the official record:

MACHINE FOR MAKING RECTANGULAR BANDS.

To M. Blakey, *Etia*, Pa.—July 3.—The heated blank, of suitable size, fed between the mandrel and one of the lower rolls, is deflected by the guide block, caught by the

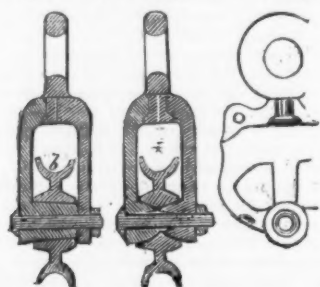


opposite lower roll, and made to conform to the shape of the mandrel as the rolls and mandrel turn in opposite directions, the large lobes of the rolls traversing the long, and the small lobes the short, sides of the mandrel.

1. In a machine for making non-cylindrical bands or blanks, the combination of a series of lobed rolls and a mandrel.
2. The combination of a series of lobed rolls, a mandrel and guide block.

METAL PULLEY BLOCK.

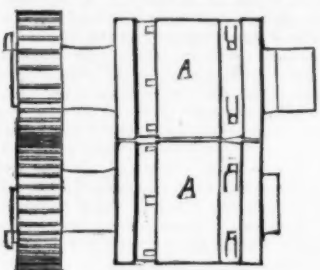
To E. A. Scoville and W. L. Scoville, *Manitius*, N. Y.—July 10.—A pulley block, formed of two parts secured together and supported



at the center by the projections on which the pulley runs, bolted and secured as and for the purpose specified.

MANUFACTURE OF BLANKS FOR CUTLERY.

To C. G. Hallas, F. W. Flower and E. Pearson, *Sheffield*, England.—July 17.—1. The rolls A, A, recessed and formed substan-



tially as described, for producing blanks for table cutlery.

2. A continuous series of the rough blanks for table cutlery, rolled in one piece, with the bolsters or shoulders at regular intervals and adapted to be cut up into lengths.

192,402.—*Bench Plane*.—C. L. Adancourt, Lansingburg, N. Y.—June 26.

The body of the plane is provided with adjustable extension sections attached to its ends for the purpose of increasing the length of its bearing surface. The reversible cutting bit is attached by a slotted opening to and rests upon a hinged bank supported upon trunions in the side walls of the plane, and the lower ends of the bank and bit are raised or depressed by means of an adjustable eccentric pivoted to the base of the plane, and provided with a suitable handle.

192,437.—*Wire Straightening and Cutting Machine*.—Irving A. Kilmer, Cobleskill, N. Y., June 26.

A double machine, having duplicate devices at each end, and a mediate carriage for taking two wires, one from each end reel toward the other end of the machine, and straightening and cutting off any desired length of each wire. One wire is passed from one—say the left-hand—reel, through a guide and friction rollers, all adjustable to regulate tension, and between the jaws of a one-way clutch, which is held open (when closed this clutch prevents a forward movement of the wire), and on through another one-way clutch, (this clutch prevents a backward movement of the wire), and thence into a die, under a cutter and in a sliding cross-head; and thence into a clutch on one end of a carriage adapted to reciprocate lengthwise of the machine. This carriage, being moved, draws the wire forward to the right till the carriage strikes the right-hand sliding cross-head, which it presses forward close against the right-hand table. Now, another wire, which has been led from the right-hand reel and put through duplicate guides, wheels, and clutches on the right-hand table, and into a duplicate die in the right-hand sliding cross-head, is, by the repression of the cross-head, by the carriage, made to project from the die with enough exposure that it may be, and is, seized by the duplicate clutch of the carriage; also, when the carriage strikes the cross-head it closes the first clutch on to the first mentioned wire, and so prevents that wire from moving forward, and since the carriage clutches the advance end of the same wire, and advances to repress the sliding cross-head, that wire is straightened (and it may be stretched) between the two clutches. The carriage now starting backward, a spring hook on the right-hand table opens that clutch of the carriage which holds the advanced end of the first wire, and that end

AMERICAN SCREW CO.,

Providence, R. I.

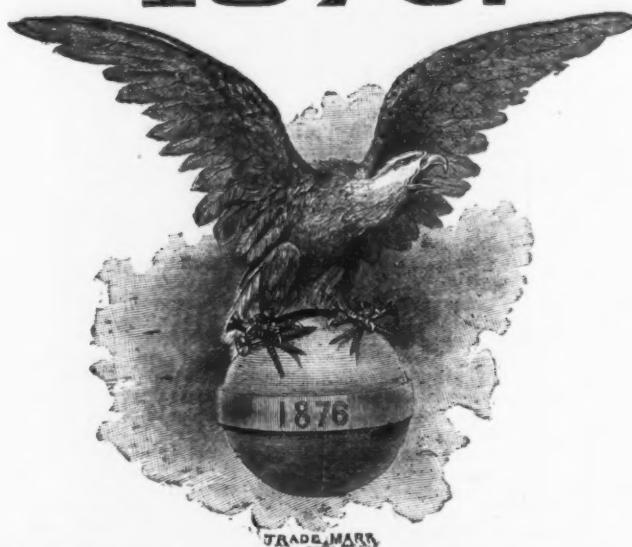
Manufacturers of

IMPROVED

Gimlet Pointed Wood Screws,

Patented

May 30,
1876.



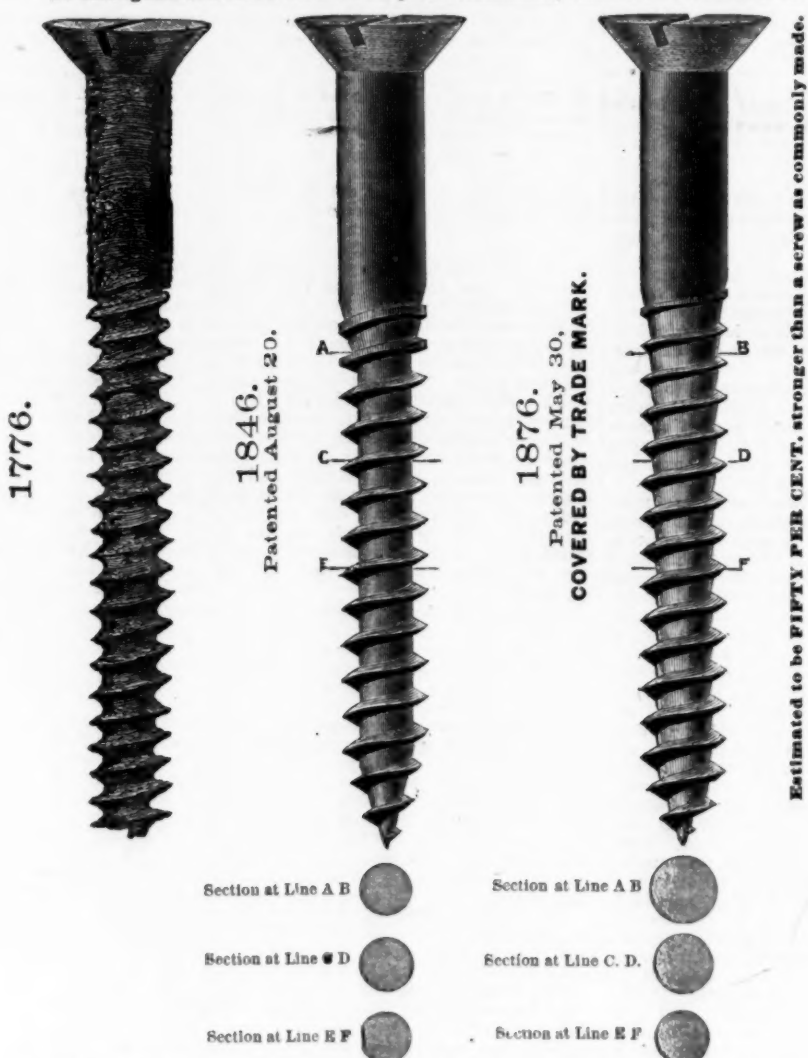
TRADE MARK

After forty years' experience we offer to the trade our Centennial Screw, patented May 30, 1876, as the best we have ever known.

The method of manufacturing is also patented, and we are changing our machinery as fast as possible, to manufacture the improved article only. To introduce them, they will be sold at same price as the old style screw.

The new screws will be packed in manila colored boxes with new label covering end of box, and enlarged figures showing plainly contents.

To distinguish this screw we have adopted a trade mark, which is also secured to us.



Estimated to be FIFTY PER CENT. stronger than a screw as commonly made.

The above drawings show the progress of screw making from the old blunt point to style now adopted.

Experience has shown that the weak point of screws, as formerly made, is at the heel of the thread, where all the strains of forcing the screw into the wood naturally concentrate.

To avoid the sharp angle existing in the old style of screws has been the aim of all manufacturers, but every expedient hitherto adopted has proved as objectionable as the evil complained of.

It will be seen in our new screw that not only is the sharp angle avoided, but the strength very much increased, as illustrated above. See sections at lines.

CLAIM.

"A Pointed Wood Screw having the outer periphery of the thread upon its body cylindrical, while a portion of the body below the thread and near the neck is conical, the remainder of the body to the point being cylindrical, and yet having all the thread brought to an edge of a constant angle, without jogs in the paths between the threads, substantially as described."

of the first wire drops free, the wire remaining sustained in the die in the left-hand cross-head, and being kept from retrogression by the second clutch on the left-hand table. The carriage, continuing to recede to the left, not only draws the second wire to the left, as before the first wire was drawn to the right, but also, by a cam on it striking a lever, actuates a cutter to cut from the first wire the straightened portion, which falls free from the machine; carriage moves on leftward, takes up the bight of the first wire, goes to the right with it, and on its way cuts a straightened length from the second wire, and so on. Should either wire fail to unwind, its reel moves inwardly, and shifts the driving belt on to a loose pulley, and so stops the carriage.

192,824.—*Gauges for the Manufacture of the Chasers of Screw-Cutting Dies*.—John J. Grant, Hartford, Conn.—July 10.

Seats corresponding to those of the die in which the chasers are finally placed are formed on the sole-plate. The threads of the chasers are made to coincide with those of a stem projecting from the sole-plate, and the chasers are then removed from their seats and placed in the die-plate formed for their reception.

192,909.—*Electrical Apparatus to Indicate Overstrain or Weakness in Roofs, Bridges or Other Structures*.—John Forbes, Dartmouth, Halifax, Nova Scotia, Canada.—July 10.

A means for obtaining a prompt indication of the unsafe condition of such structures.

193,227.—*Mine Pump*.—E. Daggett, Salt Lake City, Utah.—July 17.

1. In a mining pump the combination, with a reciprocating pipe, a pump barrel and suitable valves, of an auxiliary or water-balance chamber, substantially as described, whereby the weight of the pipe may be wholly or partially balanced.

2. In a mining pump having a reciprocating pipe, the combination, with said pipe, of a discharge tank provided with a stuffing-box in its bottom for the passage of the pipe.

193,228.—*Mine Pump*.—E. Daggett, Salt Lake City, Utah.—July 17.

To stationary pump barrels with suitable valves and two reciprocating pipes which operate simultaneously, so that the several barrels and pipes co-operate as one pump, the water being forced from the lowest pump to one next above, and so on until it can be freely discharged at the top of a shaft, or any lower point from which flowage is desirable.

1. In a mine pump two or more stationary pump barrels placed one above the other and provided with suitable valves, in combination with two or more reciprocating pipes which are connected to each other by tie-bars, and operate simultaneously with their respective pump barrels.

2. In a mine pump the combination, with a pump barrel, a reciprocating pipe and suitable valves, of a tank mounted upon the upper end of the reciprocating pipe and moving with it.

193,236.—*Manufacture of Anchor Points*.—Wm. N. Fisher, Boston, Mass.—July 17.

The arm approximately shaped together with the palm. Both, at a welding heat, are placed in proper-shaped dies, welded together and shaped, and the point is subsequently sheared in other dies.

193,252.—*Machine for Milling, Pointing and Shouldering Keys*.—Henry G. Hotchkiss, New Haven, Conn.—July 17.

The tools for pointing, milling the body and shouldering the key are advanced to their work, in the order named, by means of the cam acting on pins on as many slides, the first passing through the hollow spindle and chuck, the two last pivoted centrally beneath the key on a common shaft. The milling jaws are connected to their slide by links, and open or close as the slide advances or recedes. One of them is rabbeted to receive the shouldering tool, which has a spring connection with its slide.

How Mr. Gowen Means to Treat the Miners.—With regard to the adjustment of wages of coal miners for August, Mr. Gowen writes to the committee as follows: "We have received notice that three of our collieries have been drawn among the five to determine the rate of wages for August. Under our agreement with the men, the price of coal of the preceding month establishes the rate of wages for the succeeding one, and thus the wages for August would be based upon the price of coal in July, which was probably the lowest of the year. As there has already been some advances of prices in August, and will probably be a much larger advance in September, and as our men have behaved so well during the recent troubles, I feel disposed to give them the benefit of the advance of prices as they occur, and not to take advantage of the strict terms of our contract, under which we would have the right to pay August wages based upon July prices. We will, therefore, not make any return at the usual time of July prices, but if the men continue to behave as well as they have done, we will, at the end of August, return the higher prices of that month for the month of August and so on during the year, and I have but little doubt that the individual coal operators will unite with us in this course."

"Fulton's Folly."—On the 18th of August, 1805—72 years ago—Robert Fulton took his departure for Albany on board of his venture, the Clermont, and satisfied the people of the United States of the possibilities of steam navigation. He had been superintending the construction of the boat for a long time, and people looked upon Fulton as a fool, and the boat itself was christened by the mob "Fulton's Folly." It did not daunt his enthusiasm in his project, however, and the day that she was launched he made promises concerning her future triumphs which caused his best friends to look upon him as demented. It is hard to describe at this day the surprise of the thousands of spectators who witnessed his first voyage on the Hudson. They saw the wheels of the vessel revolve slowly at first and the craft glide up the river, and when she passed the sailing vessels their astonishment was such that they looked upon Fulton's discovery as the work of the devil and to be denounced as such.

N. & G. TAYLOR CO., Philadelphia. TIN PLATE.

We have the **LARGEST** Square Sheet of Tin Plate ever made, 144 inches long by 48 inches wide.

ALSO,

The **SMALLEST** Sheet of Tin Plate ever made, 6 inches wide by 10 inches long.

Between these extreme sizes we have open for inspection our immense stock of odd and regular sizes of Tin Plates of all grades, qualities and thicknesses, ranging from number 38 to number 12 gauges.

In addition to the above—and our assortment of special Patterns, Splayed Boiler Sheets, Milk Pan Tin, Stove Door Lining Plates, etc.—we always carry in large stock,

CIRCLES of Every Description,

From 6 Inches to 40 Inches, 10 to 8X Thickness, No. 30 to No. 20 Gauge, 3 Ounces to 30 Pounds Weight.

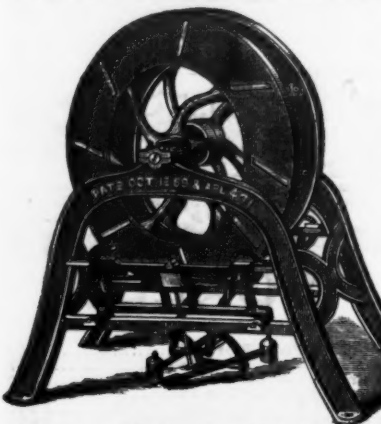
These are all stamped out, by correct dies, from the very finest quality of Charcoal Plates, and afterward tinned.

Send for our illustrated catalogue, descriptive circulars and price lists.

When desiring any information on Tin Plate, it will be to your advantage to write us.

N. & G. TAYLOR CO., Philadelphia.

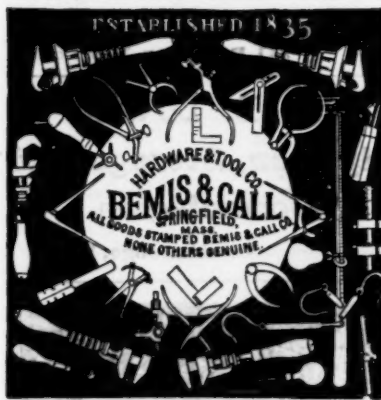
CROSSLEY'S Patent Stave Jointer.



The most Simple, Durable and Perfect Jointer made. In four sizes, jointing from 16 to 46 inches in length. In use from Maine to California. Is used by the largest stave and barrel manufacturers in the world. Will pay for itself in 90 days in saving of time and timber over any Saw Jointer ever used. Send for circular to.

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HARDWARE.

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Manufacturer of Patent

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Pad Locks,

FOR

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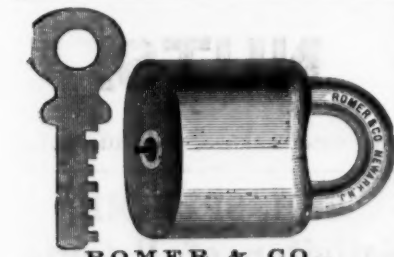
AND THE HARDWARE TRADE

All sizes, with Brass and Steel
Keys, with and without chains.

PASSENGER CAR LOCKS,

Brass, Nickel-Plated and Japanned.

BROOKLYN, N. Y.



ROMER & CO.,

Established 1857. Manufacturers of Patent Scandinavian or Jail Locks. Brass Pad Locks for Railroads and Switches. Also, Patent Stationary R. R. Car Door Locks. Patent Piano and Sewing Machine Locks. 141 to 145 Railroad Avenue, NEWARK, N. J. Illustrated Catalogue sent on application.

The Patent Automatic Stokers

which were shown by Dillwyn Smith at the Centennial Exhibition in the British section, and obtained the medal and highest award, are now offered to the users of steam in the United States, by the "United States Automatic Stoker Co." under a license from Dillwyn Smith, for use on land boilers, with full confidence that the satisfactory results obtained in Great Britain and on the Continent of Europe (where over 1200 of them are in use), will be fully realized here. Some of these results are: The generation of from 25 per cent. and upward of steam from a given grate surface above what is obtained from the same quality of fuel fed by hand. The lessening of the cost of steam from 10 to 30 per cent. from being able with the Stokers to properly burn a lower priced fuel. The entire removal of the smoke nuisance. The lessening of the labor of the fireman. Their use also materially reduces the temperature of the fire room and also prevents the injury to the boiler caused by the contraction and expansion of the plates resulting from the frequent opening of the fire doors in hand firing. These and other advantages have secured their introduction into the boilers of many of the largest Mills and Iron Works in England and other countries, and we are now turning out an average of 10 machines per week. A few letters are given from some of those having them in use, the statements in which can be implicitly relied upon. For information respecting price, &c., apply to

THE UNITED STATES AUTOMATIC STOKER CO.,

DILLWYN SMITH, President, 2 Chestnut St., Philadelphia.

LAND MACHINES.

From A. M. Collins, Son & Co.'s Factory, Third and Canal Streets, Philadelphia.

DILLWYN SMITH, Esq.—Dear Sir: After several

months' experience with your Automatic Stokers, we

take pleasure in stating that they have proved entirely

satisfactory to us. The saving in cost of fuel we esti-

mate at 20 per cent. Increased amount of steam fully 30

per cent. Beside giving us a very regular supply, the

variation not being appreciable on steam gauge. Hop-

ing you may be successful in introducing them into

general use in this country, we remain,

Yours, truly,

A. M. COLLINS, SON & CO.

Wigan Coal and Iron Company.

Wigan, September 29, 1875.

Dear Sir: I have pleasure in certifying that the

Stokers applied to our boilers at Kirkless have worked to our satisfaction, and have effected a saving in fuel. Be good enough to put in hand a more for the range of boilers at our Alexandria Pit.

I remain, yours, truly,

W. H. HEWLETT.

From J. R. Jones, Esq., Attercliffe Paper Mills, Holycroft.

Your Stokers answer my purpose; without them I

could not have obtained that regular supply of steam

throughout the day. I formerly used coal; with the

Stoker I use slack, and save fully 25 per cent. in cost of

fuel. They are suitable for all boilers.

The Earl of Dudley's Round Oak Works,

Birmingham, 6th March, 1876.

I have much pleasure in stating that the Stokers you

have fixed at these Works are giving most satisfactory

results. The first you put down convinced me that we

could use it for burning the fine screenings or dust from

the stack; and those you have since erected have fully

confirmed me in that opinion, for not only do we now use

the screenings we could not previously burn at all, but the

generation of steam is so rapid that we have discon-

tinued using one of the boilers, finding we can obtain

the aid of your Machine, quite as much steam from

three boilers as we previously could from the four.

Yours, truly,

R. SMITH CARSON.

Burns Mill, Ashton-under-Lyne,

20th September, 1875.

Dear Sir: We have had your Patent Mechanical

Stokers in our use for some time, and find they work to

our entire satisfaction, and effect a considerable saving

in coal.

Yours, respectfully,

OLUFHAM WHITTAKER & SONS,

Per W. TROOP.

Note.—They have ten double Machines at Work.

THE AMERICAN MACHINE COMPANY, Philadelphia, Pa., MANUFACTURERS OF SPECIALTIES OF LIGHT IRON WORK.



CROWN WRINGERS,

with Patent White Rubber Rolls, Galvanized Malleable Iron Frame Work, Resilient Steel Springs, &c. Noted for Strength, Durability, Efficiency and Simplicity.

No. 2, Rolls 1 1/2 in. diam., 10 in. long. No. 2 1/2, Rolls 1 1/2 in. diam., 13 in. long.

No. 3, Rolls 1 1/2 in. diam., 12 in. long. No. 4, Rolls 2 in. diam., 13 in. long.



CROWN FLUTING MACHINES,

with valuable improvements over other style Machines, Patent Spring Arrangement and Clamping Device. Noted for Superiority of Finish and Practical Advantages. The leading Machine in the market.

Sizes (length of Rolls), 4 1/2 inch, 6 inch and 8 inch.

Rolls with 10, 12, 15, 18, 22, 26 and 30 flutes.



PATENT CONVEX
Fluting & Smoothing Iron.



A NEW
Drawer Lock.

THE
"STANDARD."

Applicable also to Cupboards, etc.

Made wholly of Brass, and finely finished. Each

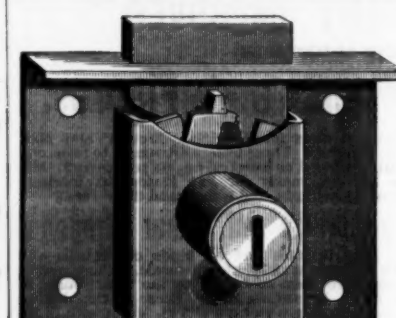
Lock has two flat, steel, nickel-plated Keys.

Dealers desiring to examine this Lock will re-

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The Yale Lock Mfg. Co.

STAMFORD, CONN.



List Price, - - \$8.50 per dozen.

The Famous Improved SHEPARDSON LOCKS

Are the "Best" in the World.

The United States Lock Co.,

Office and Manufactory, KINGSTON, MASS.

WM. F. DONOVAN, General Manager.

NEW YORK OFFICE, 97 Chambers Street.

H. BLISS MANUFACTURING CO.,
Manufacturers of Hand and Bench Screws, Clamps, Chisel, Auger and Brad Awl Handles, Book Binders' Presses, Flows, Sewing Benches and Finishing Tool Handles, Croquet Games, Tool Chests, Toys and Novelties.
Illustrated Catalogue and prices furnished on application.
Pawtucket, R. I.

Curiosities of British Trade-Unionism.

The difficulties in the labor market have had, among other effects, that of bringing forward a number of grumblers at the manner in which the British workman now pursues his calling. Thus a correspondent of the Liverpool Courier narrates the following cases which have come within his "own knowledge." "A gentleman in Warwickshire, six miles from a town, required some alterations and repairs to his house. The first day the workmen came out he found them on his lawn under a tree smoking, and on inquiring why they did not set to work, was told the 'club' allowed an hour for every three miles from town. The railway brought them in 20 minutes; they therefore had an hour and forty minutes to spare, and would be fined if they started work before the time. Recently I required four or five new bricks in the back of my kitchen grate. Two men came to do the job. I asked what the second man was for, and was told the 'club' required that each brick setter should be attended by a laborer, 'but this chap can't do nought at this job, but I should be fined if I come without him.' When the town hall in one of the pottery towns was being built, the architect procured certain ornamental bricks from Kent. The club declined to allow the workmen to use them, because they came from a distance beyond the radius prescribed by its rules. The men were ordered to strike, and the building was finished by men imported from France, and for some time military protection had to be given to the strangers. When Watts & Co., of Manchester, were roofing their new warehouses, the contractor used horse-power to hoist the slates. When a third of the work was done the club ordered the slating to be undone, the slates taken down and carried up ladders by men. The contractor refused, the men were ordered to strike, and the contractor and his partner finished the job with their own hands, and became liable to heavy forfeit for non-performance of contract to time. Recently two new shops were erected in Manchester fronted with Bath stone. Every stone arrived ready for fixing, but the club declined to allow the stone to be used unless the dumb show of 'tooling' was gone through on the ground, and the men paid the same as though they had actually toolled it. This was refused; the men were ordered to strike, and the work was finished by Belgians. I could fill a book with similar instances of union tyranny. Workmen have repeatedly told me that they won't bring their sons up to their trade, as no union man has any chance of rising above one miserable dead level; and that as regards pay, the scamp and 'duffer' is as well off as the skilled man and the sober man, and that inevitably the quality of British work must deteriorate. Indeed, that it has deteriorated during the last 30 years is evident to any one old enough to remember the work done 30 years ago, or intelligent enough to observe the difference between modern work and the work of our fathers' time."

Another gentleman, writing to the Manchester Examiner and Times, says: "A short time ago a friend of mine had a bit of joiner's work that required doing, for which 1/6 would have been an ample payment. One day a joiner came to the job, but speedily adjourned to an adjacent beer house, and his visits to that place of refreshment were repeated at short intervals during the day. My friend thought this style of thing looked more like play than work, but he was undeceived when he received a bill of 7/6 for 10 hours' work, at 9d. per hour. This case clearly shows who will have to pay the additional sum per hour should the joiners succeed in the strike in which they are now engaged; and it will not be denied that in most trades increased wages mean greater intemperance, with less work, and that of an inferior quality."

The Practical Use of the Telephone.—Mr. C. A. Cheever, agent for the telephone in this country, has lately placed in this city several telephone instruments and wires. One of these connects his office with the Champion Burglar Alarm Company's office at Thirtieth street and Broadway, by a circuitous route, using one of their old telegraph wires, between three and four miles in length, as the medium of communication. Mr. Cheever has another wire running to Broad street, in communication with an establishment engaged in the construction of telegraph lines. Another line connects Mr. Cheever's office with the office of Dickerson & Beaman, lawyers, in the Staats Zeitung building. The reporter enjoyed a conversation with Mr. Beaman over this wire, and found that words could be transmitted at the rate of about 200 a minute. Mr. Cheever is erecting a line for the Clyde Steamship Co. from its office in Bowling Green to Pier No. 2, North River, from which its steamships sail. This is a circuitous line about five miles in length. The piers of the Brooklyn Bridge are also being connected by telephones with the superintendent's office, so that all the movements of the "travelers" in carrying the wires across from pier to pier can be communicated and directed without the use of signal flags as at present. The current of sound in these telephones is carried by a single wire in either direction. All that it is possible to do in ordinary conversation between two people sitting within 2 feet of each other in a room can be done at the distance of 5 or 10 miles, or even a greater distance, by simply raising the voice and speaking a little slower than naturally. The telephone instruments themselves are very simple, consisting of two wooden tubes, one of which is placed at the mouth, the other at the ear. The extension of these telephones all over the city in place of the electric telegraph is thought to be only a question of time.

A new material called eburite, apparently capable of extensive employment in the arts, is made in this way: To the dust of bone or ivory, gum tragacanth and any suitable coloring matter are added. The whole is then pressed. Sometimes a very intimate union is formed between the particles of bone or ivory by heat and pressure without any gum

"The Rebellion of Labor."

To the Editor of The Iron Age.—DEAR SIR: Under the above caption you put the following interrogatories in your issue of the 2d inst.: "Why are these thousands idle? Why are the wheels of industry locked and the furnace hearths cold while uncounted wealth lies unutilized and the great plains of the West are white with the promise of an abundant harvest? Why is it, with wages so low that honest labor goes hungry, prices in many departments of trade are below the net cost of production?"

Sometimes questions are asked which are not intended to be answered, and sometimes they cannot be answered, but we are honest enough to think that if a fair and non-partisan answer to the foregoing were presented, with its argument, you would entertain it. We will simply refer to recent history, without entering into party politics. When *The Iron Age* first presented to the reading public the greenback system of finance, it caught the eagle eye and the far reaching sagacity of Hon. S. P. Chase, then Secretary of the Treasury. That system with some modifications was adopted by Congress to meet the then existing emergencies of our crippled financial condition. It proved to be the great panacea for the financial ills, and had it been kept in its original channel it would have floated us over innumerable sand-bars, and the panic of three years ago, and also would have obviated the necessity of answering the questions above propounded. Class legislation in the interest of the money power of this and foreign countries has brought about the present condition of things, out of which spring the above interrogatories. Twelve years ago we were emerging from the most gigantic war this country ever had. The thousands of men retiring from the battlefield were distributing themselves among the agricultural fields, and pushing forward the wheels of industry, building the furnace fires, delving in the mines, and no laborer was measurably paid and none went hungry. We were entering upon a period of material prosperity. The scourge of war being removed, and no famine, pestilence, or public calamity threatened, and the people as contented and satisfied as it was possible for our ambitious and restless population to be, everything conspired to prosperity and the pursuit of happiness. But, unfortunately, just at the juncture of our anticipated recovery from financial paralysis, the monetary doctors prescribed depletion by bleeding, and through that system of treatment the circulation became irregular and local; and hence, instead of a general and healthy circulation by which the whole body politic was supplied, the patient now lies a helpless paralytic engorged with local congestion. While our circulating medium was in the hands of the masses and unrestricted by class legislation we were prosperous and satisfied, but when the retiring of the currency began and the character of it was changed from non-interest bearing debt to gold bonds bearing interest in gold, then the small veins began to show the weakness of the circulation, the small arteries showing a sympathetic action, until now there are little or no pulsations except in the great reservoirs of wealth, and hence the question, why are these things so? The specie resumption act has been perhaps the most potent of all causes that has produced our present financial lethargy. Its twin sister, the demonetization of silver, followed as a natural consequence; the non-taxability of government bonds, the commissions allowed to national banks, the extravagant donations of public lands to private interests, all in their several channels have wrought out their natural and pernicious results. There is no assignable reason other than those given above and their kindred type why we should not be as prosperous to-day as we were in 1865.

The whole country is in a state of anxiety about the solution of the specie resumption problem. If that act is carried into effect there is but one way to solve the problem, and that is that our condition must necessarily grow worse until the final sale of this government is made to foreign capitalists. From the small amount of gold—not exceeding \$50,000,000—in the United States Treasury on the 1st of July last, it is utterly impossible to obtain gold sufficient upon which to resume specie payment other than by issuing bonds payable in gold and selling them in foreign markets; hence, when that sale takes place we become serfs to the foreign moneyed aristocrats. Our answer to these questions and our remedy for the calamities now upon us are to return to the base line of the greenback system, and let the government issue the circulating medium in amount and kind that we had in 1867. The South is in a comparatively quiet condition, heaven's blessings have been bountifully bestowed upon us in the abundant harvests, there is no friction nor trouble throughout our borders other than that which arises from our financial condition, and with the same financial standing now that we had then we would be like prosperous and satisfied.

Toughening Glass by Compression.—In the Siemens' glass works at Dresden, there is now manufactured a product which has the same properties as La Bastie's tempered glass, the strength being communicated by the pressure of metallic rolls. Plates can be made, by this method, of much larger dimensions than by La Bastie's. They have a beautiful look, and can be ornamented with the most complicated designs, at a less cost than ordinary glass. Siemens claims that glass manufactured by his process has a greater strength than tempered glass, in the ratio of 5 to 3. When broken it shows a fibrous structure, while La Bastie's is crystalline. For equal thickness the resistance of a plate of compressed glass is from seven to ten times as great as that of an ordinary plate. In trial experiments, performed before the Berlin Polytechnic Society, a lead ball weighing 120 grammes was let fall, from different heights, upon plates arranged horizontally and supported only at the four corners. While an ordinary plate was shattered by the weight falling from a height of three decimetres, the plate of compressed glass of like dimensions broke only when the weight was let fall from a height of three metres, and even then only

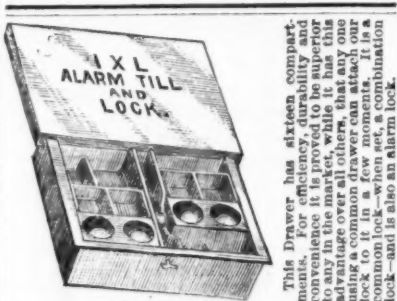
under the influence of many successive blows.—*Deutsche Polyt. Zeit.*; *Il Politecnico*, April, 1877.

Spontaneous Production of Protoxide of Iron.—M. Terrell, who is at the head of the laboratory attached to the Paris Academy of Sciences, has investigated the oxidized crust which he found rapidly accumulating on the surface of the iron rods of the registers of a Siemens furnace. This furnace was of a new design. It might be supposed at first that this crust consists of magnetic iron oxide, but this substance forms really only a fourth, hardly that, of the total mass. The great bulk consists of the protoxide of iron recently discovered by M. Debray, protosulphide of iron being present in the proportion of about 1 per cent. M. Daubree remarks that this unexpected product, so far from being accidental, is quite normal, and occurs in spite of the strong clay lining of the rods, when they are plunged into a reducing atmosphere. The latter, according to M. Gigat, contain 64 parts nitrogen, 26 carbonic oxide, 16 hydrogen and 4 carbonic acid. The thickness of the deposit is estimated at half a millimeter a day.

L. M. Heery, a mill superintendent of Hinsdale, Mass., has by an ingenious invention much increased the capacity of the sewing machine. His machine has an arm and stand like the ordinary machine, but instead of a single needle it has three, with three separate bars to work them, but the number of needles can be increased *ad libitum*, as can also the size of the machine. Each needle sews a separate seam, sewing either straight or zig-zag, or in other ornamental shapes. All the needles can make either the lock or chain stitch, and the machine will finish a quilt or comforter or make a shirt bosom at one passage through, no matter how many sewings or lines of stitching are required. Mr. Charles Kellogg, an ingenious mechanic and inventor of North Amherst, Mass., who not long ago invented and perfected the paper bag machine, has for the last year been engaged in building a machine for fastening buttons on to cards, a process heretofore done by hand with a needle and thread, a day's work being about 40 gross for a smart workman. The machine is calculated to fasten one gross per minute on cards containing two dozen each, or 60 gross per hour, and the model for the patent office cost \$1600, though duplicates can probably be made for \$300.

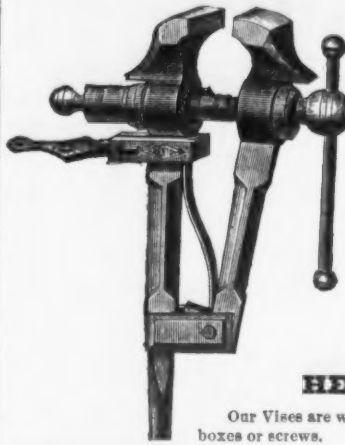
The Wrought Iron Bridge Co., of Canton, N. Y., have the contract for rebuilding the bridge over the Connecticut River, at Northampton, Mass. The bridge has a total length of 1219 feet, in eight spans, with 18 feet roadway, and will cost about \$27,000, exclusive of flooring. This company are also building a 930-foot bridge in six spans, with 16 feet roadway, at Columbus Junction, Iowa, being the longest highway bridge in the State, and have the contract for six 120-foot spans, with 18 feet roadway and 5 feet sidewalk, at Paris, Ont. They have just completed a 160-foot bridge with 30 feet roadway, and two 8 feet walks on iron piers, 25 feet high, at San Jose, Cal., and are building a 256 feet span, with 18 feet roadway, at Preston, W. Va. All of the above bridges are on the company's patented truss plans, with all wrought iron details. The company have now over 12,000 feet of bridging in process of construction, and are running their work day and night, giving employment to over 300 men. They are making extensive additions to their shops and machinery, to meet their large increase of business.

The Plattsburg (N. Y.) *Republican* gives the following particulars of a new manufacturing enterprise in that village: "Ground has been broken for the erection of a charcoal blast furnace. The furnace is to be 30 feet square and of a capacity of turning out from 10 to 15 tons of pig iron per day, which is then to be reduced in the forge fires and hammered, making a superior quality of malleable iron. The process is similar to that which has been in use in Sweden for many years, by which the celebrated Swedish iron is produced, and a few establishments of the kind are in operation in Pennsylvania. The advantage claimed for this process over that by the Catalan forge is that the heavy expense and waste of 'separating' is avoided, and the iron produced by it is of a much purer, more uniform and superior quality than that made in the ordinary Catalan forge. Ordinary 'chuck' ore will be used, crushed to about the size of hens' eggs, and after melting the pigs will be heated to nearly a melting point in ovens attached to the ordinary forge, and by the escape heat, after which they are reduced in the open fire and hammered like ordinary blooms. It is claimed that 250 bushels of charcoal will be sufficient to manufacture each ton of hammered iron; 125 in the furnace and 125 in the forge. Steam power will be used in running the blast furnace, the escape heat of course being utilized; but the water power as at present arranged will be used in operating the hammer and forge blasts. The forges are to be reconstructed and furnished with ovens for heating the pigs by the escape heat. It is expected that the new furnace, which, with the forges, will employ about 50 men, will be in operation by December 1."



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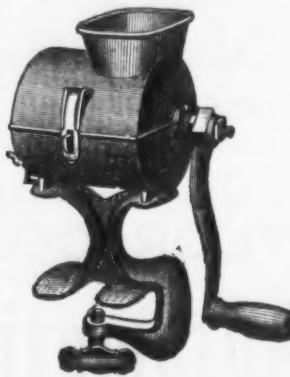
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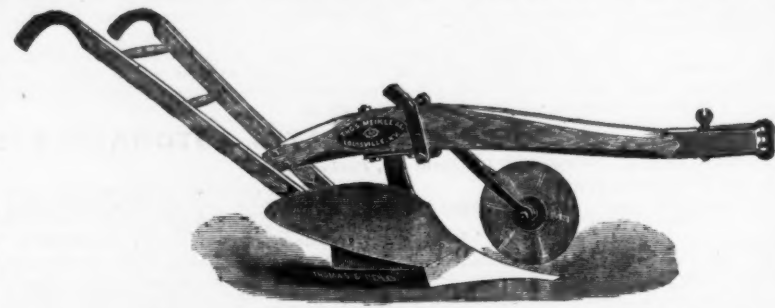
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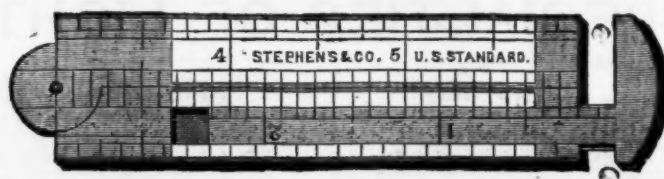
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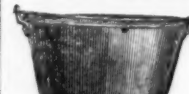
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BRITISH CENTENNIAL COMMISSION.

Extracts from the Report of Col. Sanford.

(Concluded.)

METAL WORKING TOOLS.

In a most exhaustive paper by John Anderson, LL. D., C. E., on Machines and Tools for Working Metal, Wood and Stone, we find the following very pleasant preliminary remarks:

The exhibition of machinery at Philadelphia in 1876 was a great event in the history of applied mechanics; as a whole it was a magnificent display of refined mechanism, rich in new ideas, full of fresh instruction, and most encouraging in promise of the future. Past inventions were presented under new and unlooked-for arrangements, the old ideas leading to fresh devices. It was most suggestive in presenting new forms to materials, new constructions containing original combinations of matter, in alliance with force or mechanical energy; novel applications of ingenious mechanism to useful purpose in art and manufacture, all conducive to the saving of labor, or the economy of materials, and all striving to attain excellence in production, combined with good proportion in strength, harmony and beauty in outline.

The display of machinery classed under the name of "Machine Tools" was perhaps the most remarkable feature of all. As a collection of tools it has never been equaled, either for quantity or for quality or for fitness. The grand and united effect which it produced was no mere result of repetition according to well-known forms of construction, but was due to abounding novelty, originality and progress. This department of the Exhibition had a strongly marked American character, and can hardly be regarded as an international competition. Other civilized countries, it is true, took part therein, but the aggregate did not equal one-fourth of the articles exhibited by the United States. There was also marked evidence of patriotic spirit in the prodigious efforts made by individual citizens and firms to sustain worthily the mechanical reputation of their country. The excellence and originality of the machine tools displayed by many firms impressed a stranger immensely, and however much he may have seen of former international exhibitions on the grand scale, these impressions survive.

All the machines were subjected to the most severe tests, only two of the exhibitors, one from Canada and one from France refusing to permit the experiments, and the words of Dr. Anderson have therefore great weight. He thus speaks of some of the finest exhibits:

The display of machine tools made by the United States was so vast, that only the more salient points can be noticed in a brief report. It showed certainly that the past century has not been passed in idleness, and, judging by the enormous stride made by them during the past few years, it showed that they have been intelligent students of the best European authorities. It is true to say, however, that the Americans, as a rule, are not copyists; the inventing of clever devices, and tools for saving labor, seems to be their natural forte, and worthy of the old stock, probably quickened by the peculiarly favorable circumstances under which they live.

It was the display made in this section of the Exhibition which most conspicuously brought out the enormous strength of America as a producing power. More than a hundred exhibitors had each a large exhibit that commanded the admiration of all who took the trouble to examine it in detail. In this vast array there were machines for all purposes; small-arms ammunition, sewing-machines, clocks, watches, and all the branches of machine making and engineering, and almost all were finished in a style superior to that of any former exhibition.

Probably the most exquisite set of machine tools ever made was that exhibited by the American Watch Company of Massachusetts. No mere words can convey an idea of their high standard of excellence; they must be carefully examined, handled, and felt. What the Whitworth standard gauges are to true circles and exact dimensions, these lathes and tools are to all forms required in the manufacture of watches. Add to this, great convenience in arrangement and fitness to produce the parts of a watch so exact as to be almost interchangeable.

The display of Ames & Co., of Chicopee, Mass., the Putnam Co., Brown & Sharp, and Mr. George Corlies, of Rhode Island, are next mentioned, and then Dr. Anderson continues:

The greatest display of machine tools, however, and that which dwarfed all the others in the tool specialty, was made by the celebrated firm of W. Sellers & Co., of Philadelphia. This collection of machine tools was without a parallel in the history of exhibitions, either for extent or money value, or for originality and mechanical perfection.

Altogether there were about forty distinct machines, most of them large and many of them of gigantic proportions, but all characterized by extreme refinement to the minutest details. Besides, it was thoroughly national in its character, and pre-eminently worthy of the Centennial.

A steam hammer shown by this firm was remarkable for the elegance and originality shown in several of its details, in the form and arrangement of the hammer proper, for the manner in which the hammer head is secured to the hammer, affording great convenience in fixing and unfixing. Also, for novelty in the mode of working the steam valve, and several marked improvements in connection therewith. One of the machines was for producing flat surfaces, and, although a new conception, was here developed into a practical tool for the engineer. Sir J. Whitworth was the first to develop the true surface-plate system, which has hitherto been arrived at by planing and scraping, depending on volition for the ultimate perfection of a true plane. In this new idea the true surface of a perfect table is transferred to other surfaces by moving the latter over a grinding instrument in the middle of and on the same true plane.

The most important feature is this, that the surface to be made true may be of any degree of hardness, even chilled cast iron or hard cast steel, thus opening up a new field of endless application for slide valves, and

for many parts of tools and machines where extreme hardness is a virtue. In lathes of all kinds this firm is remarkable for mathematical accuracy, and all were furnished with original devices, which enable a zealous workman to develop the produce of the lathe to its utmost capacity, yet without physical effort. By the introduction of an under V within the bed the shifting head is always drawn to the same straight line, thus avoiding the necessity of a tight fit within the shear and its consequent disadvantages. Their system of feed motion is admirable, a simple combination of disks, whereby the feed rate may be altered from one extreme to another, or to any intermediate point, by a mere touch.

Their planing machines are famous in Europe, and are now being copied in all countries. One of the largest ever made, which planes automatically in three directions, is now under construction at Philadelphia for a Russian arsenal. These planing machines are distinguished for directness in the transmission of power. The trammels which have hitherto kept engineers to spur or beveled gear are broken through; they employ the old gear only when it is the best for the purpose, but if not, they devise a new and special gear going straight to the point in whichever direction it may be. This is shown in several of their machines, including the planing, and naturally raised controversy among experts. The devices employed to give the feed motions at the proper point and to avoid a struggle between the open and cross belts at the reversing moment are most ingenious, and were much admired by the judges. One of the most striking features of the American section is the variety of special tools for all sorts of purposes. In this also they take the lead. One example was a lathe for brass work, employed in making the water injector for steam boilers. Considered as a combination of clever devices to accomplish a definite object, it was a fine tool. It enables an intelligent man to accomplish more work in turning, boring, screwing or fitting than is possible in an ordinary slide lathe which is intended for general work. Besides, it is less dependent on the workmen for accuracy.

It was the general opinion among engineers at the Centennial that this class of machinery will have to be more and more resorted to as competition intensifies, because it reduces cost of production and raises quality. Messrs. Sellers' gear-cutting machine is also well known in Europe.

Dr. Anderson also describes the Batho nut-shaping machine, the Ralph H. Twedell hydraulic riveting apparatus and the rotary puddling machine shown by the same firm.

The collection of John Roach & Son excited great admiration. One plate, said to be the largest ever made, was 28 feet long, 8 feet 6 inches wide, by 3/4 inch in thickness. A specimen of the same quality of iron worked into shape to form the head of a steam boiler was an extraordinary example of plastic malleability. It was 106 inches in diameter, and flanged 6 inches deep around the outer edge. Upon the opposite side of the plate four other flanges were worked out around four equidistant holes 30 inches in diameter, these flanges being 4 inches deep. As a piece of smithwork it was faultless. The owners, and the Americans generally, were evidently proud of such smithing. The Doctor adds: "There are few men in the world with the combination of qualities that could take in hand and execute such a piece of work for the first time. What a satire is here afforded on the modern doctrine that all men should have the same rate of pay. It was pleasant to be informed that the smith who made it was an Englishman, and it was generous of the Americans to give the information so freely.

OTHER DISPLAYS.

The firm of Hoopes & Townsend, of Philadelphia, exhibited a great novelty in punching (not shown in operation), which created a sensation among engineers from all countries, the United States included.

The articles shown consisted chiefly of nuts or other similarly perforated specimens; all were of remarkable beauty, and were given away in great profusion. These nuts had two peculiarities—they were of inordinate depth, and showed clearly that they had been punched cold. Visitors, however, did not hail this new feat in practical science; they said it was an impossibility for a 3/4-inch punch, however good the quality of steel, to penetrate through 1 1/4 inch of cold iron; that whatever might be the explanation, a punch of that diameter could not do it without being broken or crippled.

In time the secret leaked out, for it was no imposture. This firm, in punching, take advantage of the fluid property of solid cold iron or steel by introducing the element of time into the performance of the operation, giving to the punch only such a load of pressure as it can comfortably sustain, then giving up the reins to nature, when the instrument penetrates at a rate dependent on and in proportion to the fluidity of the mass. Hitherto the philosopher and the experimenter have been writing upon the flow of solids, no one heeding; but here at the Centennial was the natural law made practically available; and, unimportant as it may seem, yet vast issues are bound up therein. It seed there sown in thousands of thinking minds will bring forth many other applications in metal working, and will lead to the performance of many operations that are deemed impossible at the present time.

Dr. Anderson devotes considerable space to the interesting display in the saw mill annex, including the exhibits of Mr. E. P. Ellis, Milwaukee; Mr. Stern, the oldest maker in the United States; Mr. Richard Roberts, Mr. C. Meiners, and Mr. A. Kempf, Wisconsin. In his examination of the stone-working machinery, Dr. Anderson found much to applaud in the contributions of the Emerson Stone Saw Company and Mr. Young, of New York, inventor of the reciprocating diamond saw. Dr. Anderson, in closing his report, draws these lessons from his visit to America:

Britain and the United States are not on equal terms; by past exertion the former has become rich, the latter is still comparatively poor, but with an abundance of brain power in active exercise, America is much in the same condition as was Great Britain about half a century ago.

In this competition of tool-devising, brains count for more than wealth, and will gain an advantage; under the same conditions the two nations will probably be found to be nearly alike; both have come out of the same good stock.

Let the youth of Britain take note. Our past prosperity came by well-directed thought. As it was in times past, so now it is the same. England's future greatly depends on the intelligence and mental activity of her sons.

The judges in this department were as follows:

American—George H. Blelock, Springfield, Mass.; W. F. Durfee, Wisconsin (at 56 Broadway, New York); Professor John A. Anderson, president of Kansas State Agricultural College, Manhattan, Kansas.

Foreign—Mr. John Anderson, LL. D., C. E., Great Britain, chairman; M. le Commandant F. Perrier, France; Mr. C. A. Angstrom, Sweden; Mr. Auguste Gobert (fil), Belgium; Mr. Feltz Reifer, Austria.

SEWING MACHINES.

Mr. Frederick A. Paget, C. E., has evidently labored with tireless energy in the group embracing machines and apparatus used in sewing and clothing, and his notices of the American inventions are at once just and enthusiastic. He speaks in the highest terms of the following sewing machines: Wheeler & Wilson, Singer, Willcox & Gibbs, Weed, Howe, Wilson, and Grover & Baker. The friction belt gearing for obtaining varying speeds on sewing machines, exhibited by Mr. Howard, of this city; hide sewing machine, by Mr. G. C. Walters, of Philadelphia, and a similar machine by Mr. G. W. Baker, of Wilmington, Delaware, as well as Eickemeyer's hat blocking machine, exhibited by Eickemeyer Hat Blocking Machine Company, of New York, receive special attention. Mr. Paget next refers to the American Button-hole Machine, of this city, as follows: The button-hole machine of the American Button-hole Overseaming and Sewing Machine Company employs a straight needle actuated through a vibrating arm and cam-grooved hub, and a curved shuttle reciprocated in a plane parallel with the feed on a curved raceway. For button-hole stitching the shuttle-race is turned aside, a vibrating arm provided with a curved thread-carrying loop is turned into working position so as to carry its thread through the loop of needle thread, and above the edge of the material to be acted upon by a loop spreader.

Honorable mention is next made of the Remington and Hamburg-American sewing machines, and then follow brief references to the exhibits of Billings & Spencer Company, Connecticut; National Needle Company, Springfield, Mass.; the Lamb Knitting Machine Company; Franz & Pope Knitting Machine Company; Mr. Dana Beckford's (New York) automatic reversible machine; Campbell & Clute's upright rotary knitting machine. In cloth-cutting machines, favorable notices are made of the manufactures of Mr. Albin Worth, Staten Island; Mr. Storrs, Canton, N. Y.; and Mr. W. B. Walker, Boston, Mass. Mr. Paget reports briefly upon a miscellaneous class of machinery, including that of the Butler Braiding Company, Clinton, Mass.; the Pyramid Pin Company, New Haven, Connecticut. Mr. Oppenheimer's method of curling hair goods, and a novel "darning machine" made by the Pope Manufacturing Company, Massachusetts. The following well-known gentlemen were the colleagues of Mr. Paget in his duties as one of the judges in this group: Edward H. Knight, A. M., late of the Patent Office, Washington, president; Frederick A. Paget, C. E., secretary, Great Britain; George W. Gregory, Boston, Massachusetts; L. D. F. Poore, Springfield, Dakota.

AMERICAN ENGINEERING.

"Architecture and Engineering as displayed at the International Exhibition" is the subject of an able paper by Sir John Hawkshaw C. E., F. R. S., who was associated, during his sojourn in this country, with the following gentlemen appointed as judges for this group: General William B. Franklin, president, Hartford, Conn.; Edouard Lavoine, secretary, France; J. M. Da Silva Continho, Brazil; James B. Eads, C. E., South Pass Jetty Works, 122 Common street, New Orleans, La.; T. G. W. Fynje, Netherlands; Richard M. Hunt, 49 West thirty-fifth street, New York; Lourenco Maheiro, M. E., Portugal; Colonel George E. Waring, Jr., Newport, R. I.

Sir John Hawkshaw gives an interesting account of the engineering feats at Hallett's Point (Hell Gate), a recapitulation of which will not now be necessary, and adds a full description of the United States steam-drilling scow used in removing reefs and rocks under water. The engineering works in the Mississippi, the dredging of channels, erection of jetties, the construction of the harbor on Lake Huron, where the breakwater will be 7,000 feet long, and will inclose an area of 320 acres of 12 feet of water, and the great light-houses of the coast are all dwelt upon in detail; and the gentleman then refers in terms of admiration to some of our American bridges. Those mentioned include the Niagara Suspension Bridge, 800 feet in span; the Brooklyn bridge, the whole length of which will be 3,455 feet; the St. Louis steel-arched bridge—a work which he regards as "very remarkable for boldness of design and for originality in construction;" the iron truss bridge at Cincinnati; the Washington aqueduct, and the Girard avenue bridge, Philadelphia, which he calls "a fine structure, equal in size to the largest bridge across the Thames." The following lines from this very complimentary paper will be read with interest:

From the magnitude and number of the public works in the United States, however, other lessons may be learned than those which tell only of the science and skill of its engineers. From what I have seen, they possess enough of both to fit them for the accomplishment of any work they are likely to undertake.

The 70,000 miles of railway already constructed; the ramification of the electric telegraph, and its application to uses more extended and varied even than in our own country; the crowd of steamboats wherever navigation is possible and public convenience can be promoted; the building of cities like Chicago, which, after the great

fire, in four or five years has arisen out of its ashes a more beautiful city than before—all these tell of the increase of wealth, and speak still more strongly of the public and patriotic spirit of the people.

To me, who visited the United States on a former occasion, but so long ago that Chicago was then but a village, and Philadelphia had not more than one-half its present population, when its railways were only beginning to be made with wooden bridges and almost temporary works, when its vast mineral wealth was nearly untouched, and wood was burned where coal is now consumed, the astonishing changes, and the vast progress since made, appear greater than perhaps they will do to others whose visits have been more frequent. However this may be, what I witnessed at the Exhibition at Philadelphia, and in the districts I visited, impressed me very strongly with the energy of the people and the vast resources of this great country.

USE OF NICKEL PLATE.

Mr. James Bain, says: I think our manufacturers should specially interest themselves in the action taken by the Americans in the use of nickel. The ironmongery of a building—door knobs, hinges, and such like—which with us is mostly of brass or iron, is by them usually coated with nickel, and the result is a lightness and brightness, and a freedom from oxidation that our fittings do not possess. Their stove fronts, door plates, and other articles which we usually make of polished iron or steel, are coated with nickel by them, and varnished over with a solution of shellac in methylated spirits, which preserves the articles from oxidation and enables them to be kept clean and bright with little trouble.

LOCKS.

Upon the subject of locks Mr. Bain says: Since the days of Hobbs, who picked the famous Bramah lock, the manufacture of locks has often been observed and commented on. It is a very important branch of industry, and the extent of machinery employed and the number of firms engaged in the trade are very great. While locks of a kind similar to those made in Great Britain are plentifully manufactured in America, there are specialties as a rule only to be found in that country. Among these are the combination and chronometric locks, and these two sorts, if thought advisable, can be combined. The usual form of a combination lock is one having on it certain letters or numbers arranged in concentric movable rings. Suppose all the letters of the alphabet are upon these rings, and I resolve to lock the padlock with the letters A L O in a line; I do so, and thereafter I shift and mix the letters. No key will open the lock until the letters are again placed in the same line, and as the combination is known only to myself, additional security is obtained by the device.

Some of these locks have as many as 2000 combinations. It has been said "necessity is the mother of invention," and so it has been with the chronometric lock. It is an expensive lock, varying in price from £50 to £250. It is used for banks and safes where money and valuables are kept; and the need for the invention arose in this way. The thief-proof safes in the United States are, I believe, admitted to be superior in quality to those manufactured in Europe; and when burglars effected an entrance into a bank they found they could not drill the safe in the time at their disposal, so they adopted a different mode of robbery. The gang effected an entrance into the bank and seized and gagged the whole household. They then presented a pistol to the head of the manager and demanded the keys of the safe, and as generally a man will do anything to save his life, they got the keys, plundered the safe, locked it again and made off, leaving the family gagged. Many burglaries of this kind have occurred in the United States. To prevent such a case happening, the chronometric lock has been invented. It is a mixture of a lock and timepiece, and may also be a combination lock, such as I have described. Suppose the hour of closing the bank is 5 o'clock in the afternoon, and 10 o'clock next morning for opening it, the manager when he goes to close the safe sets the clockwork of the lock to 10 o'clock next morning, and then locks the door of the safe; that done, it is impossible for any one to unlock the door till next day; the key is of no use; but next day at 10 o'clock, the usual hour of opening the bank, the chronometric arrangement in the lock drops a bolt and permits the key to turn in the lock and the door to be opened. There are many kinds of locks in America, mostly made by machinery, and at prices from 2d. to £200 each. The quality and accuracy of the workmanship, and the great demand that exists for American locks in foreign countries, are well worthy of consideration by the manufacturers of locks in Great Britain. Among the locks exhibited by other countries, those from Norway deserve honorable mention; they are made by hand, the mechanism is exact, of excellent finish, and the price very moderate. Looking to the variety and character of the United States exhibits of building and household ironmongery, including locks, it may be said it is more than creditable, in beauty of design, tasteful finish and adaptability to the end in view, and that the manufacturers of such articles in Great Britain may acquire from them lessons to enable them to compete with the manufacturers of the United States in other countries.

CONCLUSION.

Peter Graham, Esq., report on industrial and architectural design, &c., and the paper on electric and telegraphic apparatus, by Sir William Thompson, LL.D., D.C.L., F.R.S., are both very brief, and of a general nature. The volume in which the papers are printed contains 332 octavo pages, is clearly printed, indexed, copiously supplied with convenient size notes, and handsomely illustrated with large, finely engraved plates of all Centennial buildings. The foregoing extracts will serve to show how thoroughly American achievements are appreciated; how frankly American superiority in certain directions is acknowledged, and how lightly the points of inferiority, when such exist, are dwelt upon by our English cousins. The publication of such a work in England cannot but prove of inestimable benefit to American manufacturers, and to those who regret that it is now

too late to add their support to the Centennial enterprise, to which we owe this international recognition, we have only to say, devote your time, your means, and your influence to the aid of its prototype, the Permanent International Exhibition, and the results will be even more satisfying than were the triumphs of its brilliant but short-lived predecessor.

INDUSTRIAL ITEMS.

CONNECTICUT.

The Sharps Rifle Company are sending samples of their new rifle for military use to China, and will probably receive a large order from that country. Business continues brisk at this establishment.

The East Canaan furnaces have been treated to a bit of "unfortunate luck" the past four months of summer. Early in the season the low water refused to turn their wheels, and of course the blowers ceased to breathe upon the fires with sufficient strength to melt the ores, and a stationary engine was substituted, when all went well till Sunday, the 12th inst., when the shaft to the balance wheel of the engine broke, and as it could not be repaired in time to save the blast, the workmen were compelled to blow out one of the furnaces.

NEW HAMPSHIRE.

S. C. French & Co., of Manchester, general machinists and manufacturers, report business improving in their line. Among their recent shipments are the following: a milling machine and drop press to the Studebaker Manfg. Co., South Bend, Ind.; a large iron planer to J. P. Merriam, Sandusky, Ohio; besides a yacht engine and boiler, an 8-foot engine lathe, and portable engine to other parties. Six 10-foot bed engine lathes and one 8-foot lathe have been shipped to various parties recently, besides a boiler, steam engines, turbines, and wood-working machinery. The firm have just sent out 1400 pounds of 8-inch water pipe to the Oscoda Salt & Lumber Co., Oscoda, Mich.; besides building a fine engine and hose carriage for Durham, Mass. Their orders on their books at the present time are pretty well distributed throughout the country. They are fitting up the shafting and pulleys for the Herald building in Boston.

MASSACHUSETTS.

The Hopkins Watch Tool Company, of Waltham, now employ to hands in the manufacture of tools for watch making and other purposes.

The East Wareham Iron Works have been obliged to employ extra men.

The Parker Mills Nail Company, of Wareham, will start up the middle of September.

The Ashland Emery Wheel Company has decided to remove its works to Westfield.

The rumor about the Middleboro Shovel Works is that they will probably not be started up again, the Oliver Ames Company, of North Easton, having leased the premises for the purpose of preventing any party from engaging in the manufacture of shovels in Middleboro.

NEW JERSEY.

The Rogers Locomotive Works, at Paterson, have received orders for two engines and the Danforth Works for five. This would once have been looked upon as a small number, but at the present time it is said to be a very respectable showing of "first drops of the showers."

The rolling mills at Rockaway, Morris county, which have long been idle, are being overhauled and repaired, and it is said that work will soon be resumed there by a company of capitalists.

DELAWARE.

D. H. Kent & Co., of Wilmington, report a growing trade in their several specialties—coach materials, hardware, &c. Some time ago they opened a branch establishment at 405 Commerce street, Philadelphia. Among the important agencies which they hold we may name that of the Northwestern Horse Nail Co., and that of Singer, Nimmick & Co. for their various descriptions of steel.

The Harlan & Hollingsworth Co. are running with 600 hands. Car building is at present very slack, although they have had a very fair trade until recently. Their last contract was for about 20 first class passenger cars for the Dom Pedro Railway of Brazil. In their shipbuilding department the company have under way one large iron steamer for the Morgan line of New York, and are also deepening the Morgan City, which was built for the same firm about a year ago. They are also building a large boat for one of the Brooklyn ferries and one for Philadelphia and Camden.

The Jackson & Sharp Co. also report car building very dull, and but few orders coming in. In their ship yard there is some activity, with fair prospects of its continuance. They recently completed the bark Sarah E. Ridgeway and the schooner D. S. Williams, which left their yard last week, and are now loading in Philadelphia. They have a large brig in frame which will be completed in two months. They have also quite a number of schooners in the yard for repairs. They have about 400 hands employed.

Bowers, Dure & Co. are employing rather more than 200 hands in their car shops. They have recently built a complete equipment of about 120 cars for the Philadelphia and Atlantic City Narrow Gauge Railway. These cars are remarkably light, airy and convenient, and reflect much credit on their builders. The company are now chiefly employed on Pullman cars, but business is reported rather dull.

Pusey, Jones & Co. have for some time past had a very active trade, but their most important contracts are nearly completed. Among other work which they have on hand we may mention one of the largest iron lighthouses ever built, two powerful light draft steamers for Brazil, a large amount of paper mill machinery for Japan, besides cotton presses and other heavy machinery for the South. They have upward of 600 hands at work.

The Lobdell Car Wheel Co. report business in car wheels very quiet. They are, however, building up a large and growing trade in chilled rolls, for paper mills, and have several important orders on hand, including two or three from Great Britain and one from Japan.

Hilles & Jones are engaged on marina

work for the United States government. They are also employed on orders for machine tools, &c., of which they build every variety. The Wilmington Plate Iron Mills (Seidel, Hastings & Co.) report a fair demand for plate iron, but in common with others complain that prices are unremunerative. They employ about 100 hands.

A. L. Henderer & Co., machinists, report a fair demand for mill work, carriage and wheelmakers' tools, &c. They are also quite busy on repairs of various kinds, with prospects indicating a steady and increasing trade.

Remington & Co. have just completed a large order for paper mill machinery, and report general business quite satisfactory.

PENNSYLVANIA.

The Pennsylvania and New York Canal and Railroad Company have just put in one of Ramsey's car truck shifting apparatus at Waverly, N. Y. At a trial made a few days ago under rather unfavorable circumstances, the machinery being unfinished, a box car was run a distance of 200 feet, and the trucks changed in 2 minutes and 15 seconds. It is believed that with a longer pit and an increased number of side trucks, the time can be reduced to 1 minute per car, with no other motive power than gravity, and without the use of skilled labor.

The Eureka Cast Steel Company, Chester, organized some months ago, have recently commenced active operations in most convenient and extensive premises, erected specially for the purpose. They make castings of the smallest size, up to 10 tons in weight, and suitable for all purposes. W. H. Reaney is president; W. H. Dickson, secretary, and Frederick K. Baldt, manager.

The Baldwin Locomotive Works have recently received orders for 10 locomotives for the Missouri, Kansas and Texas railroads, five for the Pacific Coast, four for the Atlanta and Charlotte Railway of Georgia, and two for the Greenville and Columbia Railroad of South Carolina.

The Erie Railway Company have given orders for the construction of 16 "Consolidation" locomotives. Six are to be built in their own shops at Susquehanna, five by the Danforth Company at Paterson, N. J., and five by Brooks of Dunkirk, N. Y.

Paxton Furnace, at Harrisburg, which had stopped for a week, is again in full operation.

Mr. B. F. Morret, lessee of the Union Forge, Lebanon county, is working the forge with a full set of hands on full time, turning out a large quantity of iron, with plenty of orders on hand.

At Westernman's, Sharon, the puddle mill went in on Monday of last week, after a stoppage of two weeks. The chain factory went in, after a stop since June 25, under the management of David Thomas, the boss blacksmith. There are only six fires on now, but we understand that more will go on soon. A new cast house, 75x45 feet, is being built for No. 1 Westernman Furnace.

Messrs. Stupp & Neff, of Womelsdorf, have reopened an ore mine along the South Mountain, which had been abandoned for many years on account of sufficient ore not being found to pay the expense of taking it out. Recently a new shaft was opened, which produces an enormous yield of the best iron ore. The firm contemplate working the mine to its full capacity.

The smoothing iron factory at Atglen was destroyed by fire a few days ago. Loss about \$2000—no insurance.

Paper wheels are now being tested under one of the heaviest locomotives running over the Philadelphia, Wilmington and Baltimore Railroad. They have been running now for some weeks, and have thus far proved highly satisfactory.

Efforts are being made with a prospect of success to re-organize the defunct Lancaster Watch Company.

At Coatesville, the rolling mills are running on small orders. The large viaduct mills have been standing idle for the last two years, with the machinery rusting, and there is no prospect of it resuming in the near future. There are between fifty and one hundred houses in and around the borough standing idle in consequence of the mills not employing more men.

Huntingdon expects to raise \$100,000 subscriptions to start experimental glass works capable of manufacturing 500 feet of polished plate glass per day. A committee of thirteen persons solicit additional subscriptions to the \$50,000 already raised.

Over one hundred car loads of iron have been received in the Altoona shops from the ruins of the recent riots. The railroad company is having it all weighed and piled up for future disposition.

The rolling mill at Greenville, Mercer county, was sold at Sheriff's sale recently for \$15,450. Mr. Benninghoff was the purchaser.

PITTSBURGH AND VICINITY.

The situation at Jones & Laughlins is unchanged. The laborers who are the only ones on a strike still hold out, and on Saturday posted a notice warning all parties to keep away.

The following coal mines on the Pan Handle are in operation: National Coal, Oak Ridge, Cherry Mines, Huntsman & Miller's, Fort Pitt, Steen & Son's works, Mansfield. On the Chartiers Valley: Summer Hill Company, Nixon Coal Mines, McCabe & Clark Mines, Bridgeville Mines.

The coopers of Pittsburgh are on a strike for an advance from 14 to 16 cents a barrel. The strikers number between three and four hundred.

One of the glass houses of the Tibby Brothers, near Sharpsburg, has shut down for repairs.

The lamp chimney manufacturers of this city have been notified by the blowers that they will demand the same production for a day's work as they made before the introduction of the patent crimping machine. With the aid of this machine a blower is enabled to turn out fifty more chimneys a day. At Wheeling the lamp blowers at the South Wheeling Glass House finally went out on a refusal of the firm to advance them from \$1.20 to \$1.50 per move. Both sides seem disposed to hold out, the men remaining there to keep the firm from putting other hands in their places. The works have secured a supply of lamp goods to meet their trade.

Shoenberger & Co., are running full, all but sheet mill.

But one Isabella furnace is in blast. Chess, Smyth & Co. are running full.

W. D. Wood & Co., are running full. MacIntosh, Hemphill & Co. are busy. They are building a new furnace for the Hocking Valley region.

Wilson, Walker & Co. are running full single turn.

Lewis Oliver & Phillips, have bought 1000 tons of scrap iron from the Pennsylvania Railroad, part of the ruins of the fire. They bid for the whole pile.

The Pittsburgh Manufacturing Company is engaged on incoming orders for agricultural tools and other similar products. They recently received an order from one Southern house for 60 tons of their manufactures.

Zug & Co. are running their nail mill full, the nail plate rolls double turn. In the merchant mill the puddlers work four days in the week.

Wm. Clark & Co. are running full single turn.

No. 1 Shoenberger Furnace is in blast; No. 2, still idle.

Both the Lacy furnaces are still out of blast.

Brown & Co. are running full, in both iron and steel departments.

WEST VIRGINIA.

The Riverside Iron Mill, at Wheeling, is running full in all departments, and it is probable the others will start on or before the first of next month.

Work has begun on the new Pittsburgh, Wheeling and Kentucky Railroad.

OHIO.

The firm of Roebeling's Sons, Trenton, N. J., manufacturers of wire rope, have just given Turner, Parks & Co., of Cuyahoga Falls, an order for eight fine wire frames.

Belfont Furnace, after a long period of quiet, was to blow in last Monday. The Belfont Company used up their metal very close, and they will have to make some more before the nail factory starts up.

Both of the Leetonia furnaces are in blast, but the puddling department of the mill has been stopped for nine weeks. The 8-inch mill will start this week. One furnace is running in Grafton, and they will start the other now that the strike is over. The coal miners are on half time.

East Liverpool is now run by natural gas. Wells are sunk and the gas comes up with great pressure. It is collected in a gasometer, and distributed in the ordinary way. Houses are lighted and warmed with it, and cooking is done at the rate of \$1.50 per month. It gives two and two-fifths greater light than the manufactured gas. Pottery furnaces are fueled with it, and everybody takes it.

The Portsmouth Foundry and Machine Works are at work on four 40-inch boilers, 50 feet long, for the new Winona, Logan county, Furnace.

Brown, Bunnell & Co.'s mills have been supplied with two additional boilers that were manufactured by themselves and put in position. Heretofore the works have been run with a battery of eight boilers; now they have ten.

The Hogen Elbow Company, Cleveland, has increased its capacity, and will turn out elbows hereafter at the rate of 75 dozen per diem. The elbows take splendidly in the market, and the firm is behind with its orders.

The Union Foundry Company, Cleveland, is very busy manufacturing small castings. J. H. Lapham has been engaged in the manufacture of zinc washboards in Cleveland for only about two weeks, and is preparing to make and dispose of the boards at 100 dozen per day. The washboards are of the Imperial, Eagle, Star and Commercial brands.

TENNESSEE.

The Southern States Coal, Iron and Land Company (Limited) has held its half-yearly meeting at Stockton-on-Tees, Mr. Thomas Whitwell in the chair. The works and premises of the company are situated in Tennessee. The report of the directors showed a net profit of £1614. 3/6 to the end of last year, exclusive of £3674 profit arising from the sale of gold at a higher premium than that now current. The company's colliery is expected to be at work by August. One furnace will be completed this year, and another is being commenced. The directors have arranged with Mr. James Brown, Jr., the present secretary, to go out to Tennessee as assistant general manager, his father being the general manager.

IOWA.

Burlington appears to be resolved upon having a rolling mill and nail manufactory. The citizens of the place are holding meetings in favor of the project, and the \$40,000 necessary has been subscribed. The mill will be moved from Cleveland, Ohio.

INDIANA.

The New Albany rolling mills are running full blast, and are shipping vast quantities of manufactured iron.

During the past week the Ohio Falls Iron Works, at New Albany, have shipped 314, 276 pounds of iron.

Things are brisk in Jeffersonville now. The ship yards are lively, the glass works are at it red hot, and the car works have gone to work in earnest.

The Ohio Falls Car Company, Jeffersonville, has received a good paying contract in the shape of 500 car-wheels for a Southern road. The car company is now employing about 450 men, and its immense departments are running in full blast.

ALABAMA.

The Eureka Iron Works are increasing in magnitude.

The Polytechnic College of Pennsylvania, located in Philadelphia, has determined to establish a preliminary course of a year. The qualifications for admissions to this course will be those required of teachers in the common schools of the State. It is hoped this new departure may strengthen this institution, where so many of our prominent engineers and metallurgists have graduated, and that the department may fill the gap so long existing between our grammar and high schools and the technical institutions of the country.

Special Notices.

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PROSPECTUS.

It is evident to all who are well informed as to the state of the metallurgical industry of the world, that we have fairly entered upon an era of exceptionally rapid scientific progress, in which many of the old methods of treatment will be superseded by new and more economical processes. The "New Metallurgy" demands a current literature of its own. Newspapers cannot give space to the calm discussion of matters of purely scientific interest; books can, at most, follow progress at a distance. The Metallurgical Review is intended to be a record of current progress, which shall combine the enterprise of a newspaper with the convenience and permanent value of a book. Its interest is both scientific and practical, and its contributors will spare no pains to secure valuable original contributions from writers of known ability and recognized scientific standing, American and foreign.

The field of the Metallurgical Review includes whatever is new and important, or which possesses historical or practical interest relating to the metallurgy of the useful metals, from the mining of the ores to the final processes which make the metals available as materials in the arts. Matters of scientific interest indirectly connected with these subjects will also be considered, when of importance to the student or the original investigator.

The indexing of the volumes will be very complete. Each will have a general index of titles and a full topical index to aid the student in searching for the student or the original investigator. A set of volumes will be a valuable library of metallurgical literature, and nothing will be omitted which can in any way contribute to the convenience of the reader.

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One Wright's Patent Cut-off Steam Engine, 14 in. cylinder, 20 in. stroke.

Two Engine Lathes, 20 in. swing, 8 ft. bed, N. Y. S. E. Co.'s make.

Two Engine Lathes, 20 in. swing, 8 ft. bed, N. Y. S. E. Co.'s make.

One Engine Lathe, 76 in. swing, 36 ft. bed, N. Y. S. E. Co.'s make.

One Iron Planer, planes 70 in. wide, 50 in. high, 27 ft. long, N. Y. S. E. Co.'s make.

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One Engine Lathe, 13 in. swing, 6 ft. bed; one Engine Lathe, 15 in. swing, 6 ft. bed; one Engine Lathe, 15 in. swing, 8 ft. bed; one Engine Lathe, 18 in. swing, 8 ft. bed; one Engine Lathe, 22 in. swing, 16 ft. bed; one 21 in. swing Upright Drill; 4 spindle Drills; four common Milling Machines; one Brown & Sharpe Universal Milling Machine; one 36x60 ft. Planer; one 8 in. Shaper; one Gear Cutter; one 2-spindle Profiling Machine; one No. 1 Bliss & Williams Press; one "Bement" No. 2 Cutter and Key Seat Drill; one new "Hardway" Bolt Heading Machine, to head up to 7/8 in. bolts; one new Hardway Bolt Heading Machine to head up to 1 1/2 inch bolts; one "Merriman" Bolt Cutter, to cut up to 1 1/2 in. bolts; one "Davy Brown" 1200 lb. Steam Hammer; one "Farris & Miles" 2000 lb. Steam Hammer.

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Four Engine Lathes, 20 in. swing, 8 ft. bed; one Engine Lathe, 20 in. swing, 10 ft. bed; one Engine Lathe, 22 in. swing, 15 ft. bed; three Iron Planers, 22 in. wide, planes 7 1/2 ft. long; one Iron Planer, 30 in. wide, planes 8 ft. long; one Iron Planer, 37 in. wide, planes 12 ft. long; one Upright Drill, 60 in. swing, very heavy; two Shaping Machines, 8 in. stroke.

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60 horse Horizontal Engine, 16x20 cylinder, \$800, good order. 60 horse Locomotive Style Boiler, \$200, good order. 6 horse Locomotive Style Boiler, \$125, good order. 4 horse Vertical Tubular Boiler, good as new, \$100. 12 horse Horizontal Engine, 7x10 cylinder, pump, heater and governor, \$225, good as new. 11 horse Vertical Engine, 7x10 cylinder, \$200. 8 horse Horizontal Engine, 6x12 cylinder, \$125, good order. We also have two new power or hand Pipe Cutting and Threading Machines, cut from 1/4 to 2 in. pipe, with full sets of dies, 1/4 to 2 nipple sockets, price \$60 each; several bench and foot lathes from \$20 to \$50. Also Steam Pumps, Pipe, Belting, Valves, Fittings, &c., &c., &c. Write us, stating what you want, new or second-hand, and we will answer cheerfully.

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I am prepared to make arrangements with Eastern manufacturers to act as their agent for the sale of Hardware, etc., on the Pacific Coast.

REFERENCES:

Sargent & Co., 37 Chambers Street, New York.

Van Wagoner & Williams, 83 Beckman St., N. Y.

T. Heesenbruch & Co., 10 N. 5th St., Philadelphia.

The Pennsylvania Tack Works, Norristown, Pa.

The Pacific Bank, San Francisco.

C. W. MAY, FIRNHABER & CO.,

PARIS,

American Commission Merchants,

Agents for Exhibitors at the French Exhibition of 1878. Sales of American Goods effected in Europe.

For a circular or Special Information address their representative,

A. W. MORTON,

22 Platt St., New York.

Export to Germany

And Surrounding Countries.

Belling, cs.	11	193	Tinware, cs.	23	540
H'p iron, bbls	200	421	Mf. iron, pks.	108	382
Grindstones,...	152	206	Lamps, pks.	3	105
Zinc, cs.,...	2	202	Revolvers, cs.	2	187
Clocks, cs.	4	75	Sew. mach. cs	4	88
Nails, kegs,...	5	114	Zinc, cks.,...	2	90
Sew. mach., cs	12	350	Iron, sheets,	30	174
Tacks, cs.,...	3	115	Cutlery, cs.,...	19	99
Pumps, pks.	4	419	Hdw., cs.,...	92	1,396
Iron safe	4	262	Nails, kegs,...	7	79

IMPORTS

Of Hardware, Iron, Steel and Metals into the Port of New York, for the Week ending Aug. 28, 1877:

Hardware.	
oker Hermann & Co.	Carey & Moen,
Wads, 33	Bundles, 331
For W. B. & Bro.	Bars, 2
Cases, 21	Prosser Thos. & Sons,
Folsom H. & D.	Tire forgings, 18
Mide, pkgs., 1	Bars, 40
riedmann & Lauter-	Rochester Screw Co.
jung,	Bundles, 18
Mide, pkgs., 3	Saxton & Seabury,
Fuller Bros.	Cases, 22
Cow Ties, 18	Scott Thomas,
King, Briggs & Co.	Bundles, 120
Anvils, 12	Woodford W. O.
Wads, 33	Cases, 3
McCoy & Co.	Bars, 22
Mide, pkgs., 5	Order,
White John G. & Bros.	Cases, 39
Cutlery, 19	Cases, 6
Needles, 1	
Woodruff A. T. & Co.	
Cases, 5	
Wiebusch & Hilger Hdw.	
Co.	
Cutlery and Hdw.	
pkgs., 10	
Order,	
Packages, 19	
Iron.	
Dennison, Thos.	
Scrap, bbls., 7	
Henderson Bros.	
Pig, tons, 50	
Marvel W. D.	
Ore, tons, 300	
Mittander Nils.	
Bars, 4022	
Nail rods, bbls., 2344	
Naylor & Co.	
Bars, 6311	
Bundles, 226	
Phelps, Dodge & Co.	
Sheet, bbls., 191	
Sampson Geo. G.	
Pig tons, 200	
Wheeler E. S. & Co.	
Bundles, 32	
Bars, 598	
Order,	
Spiegel, tons, 483	
Bundles, 240	
Steel.	
Brown Wm. & Co.	
Cases, 18	
Bundles, 147	

OLD METALS, PAPER STOCK, &c.

There are still no signs of improvement in the Old Metal market. The demand for anything in that line is very light, and the prospect of lower rates deters many from buying. Rags and Paper Stock are dull and declining. An occasional large sale is effected, but this is an exception and not the rule, as buyers are holding off and cannot be induced to purchase any considerable quantity.

The purchasing prices offered by dealers for Old Metals are as follows:

Copper.....	\$0.14	\$0.15 per lb
Yellow Metal.....	..	..
Brass.....	..	..
Composition, heavy.....	..	..
Lead, solid.....	..	..
Zinc.....	..	..
Pewter, No. 1.....	..	..
Pewter, No. 2.....	..	..
Spelter.....	..	..
Wrought Iron.....	18.00	pr ton.
Light do.....	9.00	..
Stove Plate.....	12.00	..
Machinery do.....	12.00	..
Burned Iron.....	4.00	..

The prices current for Rags, &c., are as follows:

Canvas, Linen.....	4 1/2 c.	5 c.
" Cotton, No. 1.....	2 1/2 c.	3 c.
" " No. 2.....	2 c.	2 1/2 c.
White, No. 1.....	3 c.	3 1/2 c.
Colored do.....	3 c.	3 1/2 c.
Mixed, Woolen.....	2 c.	3 c.
Soft, do.....	2 c.	3 c.
Gunny Bagging.....	3 c.	3 1/2 c.
Jute Butte.....	3 c.	3 1/2 c.
Kentucky Bagging.....	3 c.	3 1/2 c.
Book Stock.....	2 1/2 c.	3 c.
Newspaper Stock.....	2 1/2 c.	3 c.
Waste Paper and Scraps.....	1 1/2 c.	2 c.
Kentucky Bale Rope.....	4 c.	5 c.
Cakum Junk, No. 1.....	4 1/2 c.	5 c.
" No. 2.....	3 c.	4 c.
Tarred Shaking.....	1 c.	1 1/2 c.
Grass Rope.....	3 c.	3 1/2 c.

PHILADELPHIA.

Office of The Iron Age, 220 South Fourth St., PHILADELPHIA, August 28, 1877.

The past few days have developed an improved feeling in general business circles, and a more than usually large fall trade is looked for. In many departments of trade there is considerable activity, and with a firm tone to the prices of nearly all the leading staples, it is felt that the improvement is likely to be permanent. Advances from the West and South, and, in fact, from all the agricultural districts, continue to be of the most favorable character, and with the certainty of a large foreign demand for our food products, confidence is rapidly taking the place of doubt and despondency. The Iron trade is not perceptibly affected, nor is it likely that any important change will be inaugurated for some time to come. There is a stronger feeling, however, and sellers are not willing to concede anything from regular quotations, while in some instances a slight advance has been asked. This in the iron trade is an entirely new departure, and would scarcely have been ventured upon in the usual course of business. The change is so great, however, that buyers have begun to call upon sellers to ask for quotations, &c., in consequence of which they (the sellers) are beginning to show a very bold front. There is nothing at present to warrant the expectation of any important advance, but it is quite likely that the Iron trade, in all its departments, has touched bottom, and although the recovery may be slow it will be none the less certain.

Pig Iron.—The market shows no essential change of feature, prices are steady, and the demand in some directions rather more active. Taking all the circumstances into consideration, it is surprising to note the indifference which consumers manifest in regard to the future. It appears to be conceded by all parties that prices have reached their lowest point, while the advance in freight and fuel is materially increasing the cost of production. At this season, too, a larger demand is always expected, and as we said before, there is already in some quarters a more active movement, based upon actual consumptive requirements. Buyers are not in the least alarmed, however, and are as unwilling as ever to anticipate the future. Still the market is in better shape, and while it is impossible to obtain any advance in prices, the tendency is in that direction. There is less disposition to force sales, and transactions are not now so frequent at the lowest quotations, although round lots,

prompt cash and delivery, can still be secured at inside rates. We can also state that some special brands, which were offered a short time ago at concessions from regular rates, cannot be had now on the terms then named, although the parties to whom they were offered have since expressed their readiness to take the iron.

There is considerable inquiry for Iron from the pipe foundry, one firm having just closed a contract for 5000 tons Cast Pipe for Baltimore, while others in the trade have also a fair amount of orders on hand. Inquiries from the mills are unusually light, as there is very little demand for finished Iron, and in many instances Old Rails are largely used. The demand for Foundry Iron is improving somewhat, and the general outlook seems to be rather more encouraging than for some time past. We quote the market steady at the following prices:

Plate and Tank Iron.—There is no change in price or demand, but the mills are kept fairly employed. Orders are not large, but numerous enough to keep prices steady. There is some disposition to buy more freely at lower prices, but manufacturers are not disposed to make concessions, as the margin is small enough already. It is quite probable that the demand will increase shortly, as there is a fair prospect of a general improvement in business, and if certain projects now under consideration are carried into effect, Plate Iron will be required in large quantities. We quote as follows: Ship Plates, 2 3/4 c.; Tank Iron, 2 3/4 c.; to 2 3/4 c.; Shell Iron, 3 c.; Flange Iron, 4 c. to 4 1/2 c.; and Best Bloom, 5 1/2 c. to 6 c.

Sheet Iron.—The demand keeps up well, and although the season is late in opening, it is expected a full average business will be done. Prices are steady, and it seems as though bottom had been reached, as there is no disposition to make concessions unless for exceptionally large lots. We quote: Refined Sheet Iron, No. 26 to 28, 3 1/4 c.; No. 22 to 24, 3 1/4 c.; No. 16 to 21, 3 1/4 c.; Best Bloom Sheets, No. 26 to 28, 5 1/2 c.; No. 22 to 24, 5 1/2 c.; No. 16 to 21, 5 c.; Common Red Plates, 5-16 to 18, 2 3/4 c. to 2 1/2 c.; Refined Plates or Blue Annealed, 5-16 to 18, 2 3/4 c.; American R. G., 5-16 to 18, 3 1/4 c.; Best Bloom, 5-16 to 18, 5 c.; Philadelphia Russia, 9 c.; Bloom Galvanized, list, 45 per cent.; Refined Galvanized, list, 55 per cent.

Bars.—Trade in this department continues exceptionally dull, and prices weak and irregular. Other branches appear to show more strength, and there are glimpses of improvement in every direction but in the Bar trade. This dullness, however, will most likely be only temporary. If the revival be a genuine one, which there is no reason to doubt, the Bar trade must eventually come in for its share of returning prosperity. At the present time, however, business is completely stagnant, and to make matters worse, while there is no increase in the quantity sold, prices are cut lower than ever, as covering the whole market; price according to quality. We quote as before, Common Iron, 1.65c. to 1.75c., and Best Refined, 2c. to 2.1c.

Steel Rails.—Business still continues dull and quiet, and for some time past there have been no sales of special importance. Cutting has been rather freely indulged in of late, until finally prices have been marked down nearly \$2 per ton, although at the decline there is a stronger feeling. Some of the mills have been making deliveries at distant points at prices ranging from \$47 to \$48, with freights supposed to be \$3 to \$5, netting \$43 to \$44 at mills. With prospects of a larger demand, and possibly some slight addition in cost of production, sellers are not disposed to make concessions from the reduced quotations. An informal meeting of the trade was held here last week, at which all the mills were represented, and although nothing definite was accomplished the usual "good feeling" prevailed. Judging from the improved condition of railway securities and the certainty of increased earnings, a larger demand for equipments and supplies seems to be assured. Some well-informed parties assert, however, that the capacity for production is in excess of the requirements of the home demand, and a foreign trade seems to be a necessity if all the mills are to find steady employment at remunerative prices. The Pennsylvania Steel Co., we understand, are about closing their books for the fiscal year. Their total product has been about 49,000 tons. The works were closed for repairs nearly all December, and entirely closed during July. The average output was therefore nearly 1100 tons per week. In the meantime, we quote the market quiet and firm, \$44 to \$45, cash, at mills.

Iron Rails.—The outlook in the Iron Rail trade seems to improve somewhat, and two or three important contracts have been closed within the past few days. Sales reported are one lot of 2000 tons, one of 1400 tons, two of 400 tons each, and a few lots of 100 tons each. We have the exact quotations, but they cannot in good faith be made public, as they include freight to points of delivery, interest and various contingent items. Our late quotations, however, fairly represent the market, although in one transaction, the net cash price would not exceed \$32 at mills.

Old Rails.—The market is very quiet, and prices easy. Several sales are reported at \$19, and it is quite likely that figure could be shaded for a round lot. We quote \$19 to \$19.50, according to terms and quality.

P. S.—We are just advised of a sale at \$18.50, prompt cash.

Scrap Iron.—The demand is less active and prices are easier, although strictly first class selections still command outside rates. We quote Cast, \$15 to \$16.50; Wrought, \$22 to \$23.

Nails.—The demand is well sustained, and a much larger business has been done than for some months past, and with reduced stocks, holders are unusually firm at \$2.50, with 10c. reduction to buyers of large lots.

Lead.—Business is exceedingly dull, and prices are nominally unchanged—say, 5c. for Domestic, 5 1/2 c. to 5 3/4 c. for Refined; and Foreign, 6 1/2 c. to 6 3/4 c., gold. Manufactured is in good demand, and shot is especially

active, with indications of a large trade during the season. We quote: Bar, 6 1/2 c.; Pipe, 8 1/2 c., and Sheet, 9 c.; Shot—Drop, 8 1/2 c. to 9 1/2 c.; Buck, 9 1/2 c. to 10 1/2 c., all less 10 per cent. to the trade.

PITTSBURGH.

Office of The Iron Age, 77 Fourth Avenue, PITTSBURGH, Aug. 27, 1877.

Pig Iron.—While there has been no perceptible improvement in business during the past week, a better and more hopeful feeling prevails. Commission men nearly all look for an increased demand early next month, and the indications are that their expectations will be realized. Notwithstanding the vexed question of labor remains unsettled, and the probability is that the cost of Coal will be slightly enhanced, as some of the operators have already acceded to the demands of the miners, the mills will be pretty generally started up within the next week or two, and as very few if any of them have any Pig, they will be obliged to buy. However, as there is no prospect of any immediate advance, the probability is that consumers, almost without exception, will adhere closely to the hand-to-mouth policy, buy only as their immediate actual wants necessitate, and even if there should be a slight advance, it would be of short duration, as it would cause an increased production. There are a great many furnaces out of blast that would be started up if prices were to advance 50c. or \$1 per ton. Hence it is not expected, nor by many of the producers is it, in the present condition of affairs, desired, as the production, notwithstanding it is down lower probably than it has been at any time since the panic, is still too large for consumption. The cost of production has been reduced to the very lowest notch. As already intimated, it is more likely to be increased than reduced, and until there is a largely increased consumption, no improvement in prices can reasonably be expected. Bituminous Coal Smelted Irons may be quoted as follows: No. 1 Foundry, \$22.50 to \$23.4 months; No. 2 do, \$21.50 to \$22; Gray Forge, \$20 to \$21.50. Sale of 100 tons Gray Forge Neutral at \$20.4 months; 100 Red-short, \$21.50. Hanging Rock Charcoal Iron has been almost entirely supplanted here by Anthracite and other cheaper Irons; hence there is little or no call for it. A small sale of Eastern Cold Blast (Charcoal) is reported at \$33.4 months; Anthracite Gray Forge offering at \$18 to \$19.4 months.

Manufactured Iron.—A much firmer feeling has been developed recently, for which various causes may be assigned. It has been fully demonstrated that the cost of production has been reduced to the very lowest point; that labor and fuel are more likely, in view of the recent strikes, to advance than decline, and it is about as certain as anything can be that the raw article is down to hard pan. This being the case it is not strange that manufacturers have stiffened up in their views, and neither jobbers nor consumers need have any apprehensions about stocking up in view of what has been stated; in addition to which it may be well to state that stocks, both in first and second hands, are very much reduced, as buyers for a year or more past have bought only when their wants necessitated, and producers gauged their production by their orders. At present there are very few, if any, sellers under a 1.80c. base, and some are demanding 1.90c., and even 2c.

Nails.—The market is growing stronger, and in view of a steadily increasing demand and makers, both here and at Wheeling, adhering closely to card rates, there is a much better feeling in regard to the immediate future. By shading current rates slightly there would be no difficulty in making large contracts either for present or future delivery. A manufacturer informs your correspondent that he declined an order for 14,000 kegs the other day at a reduction of 5c. per keg from the regular established rates. The fact of the matter is that makers, in view of the fact that even at full card rates there is little or no margin for profit, and with every indication of a fair fall trade, and a further advance within the next few weeks not improbable, are not anxious sellers; indeed, some of them report that they are refusing to sell any large lots, either for present or future delivery. We continue to quote at \$2.25, 60 days, with the usual discount of 2 per cent. for cash. Stocks, both in first and second hands, reported comparatively light.

Horse and Mule Shoes.—There is a very fair and increasing trade, but no change in prices. Shoemaker & Co. still quote at \$3.50 and \$4.80 for 100-keg lots. Rees, Graff & Woods quote 30c. per keg off for 100-keg lots.

Steel.—This important article of Pittsburgh manufacture presents no new or important features. There is a steady demand. The mills are all in operation—some of them quite busy—and the probability is that this will continue to be the case until the close of the year. Prices continue to rule in buyers' favor, and the fact that they are lower now than ever before is increasing the consumption, causing it for many purposes to supersede Iron. Tool Steel is still quotable at \$1 1/2 c. to 1.3c. per lb., according to brand.

Wrought Tubing.—As noted in The Iron Age some time ago, while the Association of Pipe Manufacturers still exists as such, there are not for the present any combination prices. Each firm is allowed to make the best terms it can with its buyers. Hence the situation is not so satisfactory for those outside firms who refused to come into the Association or to adhere to the Association rates. It was the policy of the outside mills to keep cutting under the combination rates, which they did, and in so doing they were enabled to take considerable business from the combination manufacturers; but they will now find that cutting is the order of the day, and very likely they will be the first to cry enough.

Scrap.—The Scrap trade presents nothing particularly new or important. There is a moderate business, but no quotable change in prices. Old Rails, in which there appears to be nothing doing, may be quoted at \$19 to \$20 per gross ton. We hear of one lot of 5000 tons on the market at \$20, cash, but it is doubtful whether it could be sold at that figure, 4 months. Old Car Wheels, \$20 to \$21 per gross ton, 4 months. No. 1 Railroad

Scrap, \$23 @ \$24 per net ton. Car Springs, \$37 @ \$39.

Window Glass.—The meeting of the Western Window Glass Association, which took place in this city last week, was largely attended, and it was in session two days; however, no business of any importance to the general public was transacted, excepting to reaffirm former prices. Stock in first hands about 200,000 boxes; and while business was very generally reported dull, as it nearly always is in August, a fair fall trade is expected. Discount off Western list, 70 per cent. by the car-load, and 60 and 10 to 60 and 20 for smaller lots.

Coal.—A number of the miners in the Monongahela Valley have resumed work, the operators having acceded to their demands, but along the line of the Pan Handle Railroad the miners, or the most of them, are still on a strike. The most of the Coal mined on this road is shipped to Chicago and other points in the West, and operators say they cannot meet the demands of the miners and compete with other points. The indications, however, are that the miners generally will succeed in getting better rates for digging, and the market is considerably firmer in consequence. Prices to consumers here are from 1/2 c. to 1c. per bushel higher than at the corresponding time last year.

Correction.—Your correspondent was mistaken in saying that the Western Hoop Iron Association had dissolved; on the contrary, he is informed on good authority that it is in a very satisfactory and healthy condition, and is working fully up to the most sanguine expectations of its friends. The Hoop Iron is independent of the regular Western Association, and only Hoop makers are members. Mr. McCutcheon, of the firm of Lindsay & McCutcheon, is president, and Mr. Kennedy, of Painter & Son, is secretary.

BOSTON.

Aug. 25.—Iron.—Pig maintains the same dull tone. The furnaces are not offering quite so freely as last week, owing to the spread of the coal strike, but prices cannot be called firmer. We quote \$22 to \$23 for No. 1; \$21 to \$21.50 for No. 2, and \$20.50 to \$21.50 for Gray Forge. Scotch Pig is dull at \$24 to \$30 for store lots. Bar is dull, quoting \$46 to \$47 for Refined, and \$37 to \$38 for Common. Nails are in light demand at unchanged prices. Sheet is selling at 3c. to 3 1/2 c. per pound. Russia is quiet at 12c., currency. We quote: English Spring Steel, 7c. to 8c. gold; 9c. to 11c. for German; 9c. to 11c. for Machinery; 14c. to 16c. for Cast; 10c. to 12c. for Blister; 8c. for American Spring; 13 1/2 c. to 14c. for Cast; 9c. for Blister, and 8c. for Machinery. Copper continues dull and depressed at the decline. Sales have been limited to 200,000 lbs. Lake on the spot, at 18 1/2 c. to 18 3/4 c., and 100,000 lbs. September—October delivery—at 18 1/2 c. For Manufacturers we quote: New Sheathing, 28c.; Bolts and Braziers, 30c.; Yellow Metal Bolts, 25c. to 25 1/2 c.; do. Sheathing, 20c. Lead continues extremely depressed, and prices decidedly favor the buyer. Antimony is quiet at 11 1/2 c. to 12 1/2 c., gold, for Boston spot lots, and Spelter is easy, closing at \$6 on the spot for 10-ton lots. Tin continues weak. A large amount is on the way, which tends to depress prices. We quote Pig 5 1/2 c. to 5 3/4 c., currency; for Domestic Sheet, 9c.; Pipe, 8 1/2 c.; Tin-Lined Pipe, 16 1/2 c.; Bar Lead, 7 1/2 c., less usual trade or 10 per cent. discount. We quote Straits, 15 1/2 c. to 15 3/4 c.; Banca, 18c. to 18 1/2 c.; Refined English, 15c. to 15 1/2 c., gold. We quote Plates: Charcoal, I. C. \$7 to \$7.25; Coke, \$6 to \$6.25, and Terne at \$6.50 to \$7, gold.—Commercial Bulletin

CHATTANOOGA.

Specially reported by S. B. Lowe, Dealer in Metals, under date of Aug. 27: There has been a steady movement in Iron for the past week. Considerable quantities have been stored. In prices there has been no change:

COKE.	
No. 1 Foundry, extra.....	\$30.00 @ 21.00
No. 1 Foundry.....	19.00 @ 20.00
No. 2 Foundry.....	17.00 @ 18.00
Gray Forge.....	15.00 @ 16.00
White and Mottled.....	14.00 @ 15.00

HOT-BLAST CHARCOAL.	
No. 1 Foundry, extra.....	\$21.50 @ 22.50
No. 1 Foundry.....	19.00 @ 20.00
No. 2 Foundry.....	17.00 @ 18.00
Gray Forge.....	15.00 @ 16.00
White and Mottled.....	14.00 @ 15.00

COLD-BLAST CHARCOAL.	
Car Wheel Metal.....	\$22.50 @ 27.50
" " extra.....	24.50 @ 29.50
Forge Metal.....	17.50 @ 20.50
Muck Bar.....	15.00 @ 16.00
Old Car Wheels.....	17.00 @ 18.00
Old Rails per ton.....	15.00 @ 17.00
Brown Hematite Ore 50 to 56 per cent.	1.75 @ 2.95
Red Fossiliferous Ore 50 to 56 per cent.	1.50 @ 1.75

CINCINNATI.

Messrs. L. R. HULL & Co., under date of Aug. 25, write us as follows: Pig Iron.—The demand has been very quiet since the agricultural men have placed their orders, but from inquiries received we look for better trade in a few days. Prices remain unchanged:

HOT-BLAST FOUNDRY.	
Hanging Rock No. 1, Char-	coal..... \$23.00 @ 24.00-4 mos.
Hanging Rock No. 2, Charcoal	22.00 @ 23.00-4 mos.
" " No. 1, Stone-	coal..... 21.00 @ 22.00-4 mos.
Virginia, No. 1 Coke.....	24.00 @ 25.00-4 mos.
Ala. and Tenn., No. 1 Char'cl	22.50 @ 23.50-4 mos.
" " No. 2 ".....	21.50 @ 22.50-4 mos.
Red-short, No. 1 Coke.....	23.00 @ 24.00-4 mos.
Fannie U. S. Scotch No. 1.....	23.00 @ 24.00-4 mos.
Alice " " No. 1.....	24.50 @ 25.50-4 mos.
Am. Scotch No. 1.....	21.00 @ 22.00-4 mos.

FORGE IRONS.	
Hanging Rock No. 1 Char-	coal..... \$21.00 @ 22.00-4 mos.
Hanging Rock No. 2 Coke.....	21.00 @ 22.00-4 mos.
Virginia, No. 1 Coke.....	20.00 @ 21.00-4 mos.
Ala. and Tenn., No. 1 Char'cl	20.00 @ 21.00-4 mos.
Red-short, No. 1 Coke.....	22.00 @ 23.00-4 mos.
Cold-short, No. 1 Stonecoal.....	19.00 @ 20.00-4 mos.

CAR WHEELS AND MALLEABLE.	
Hanging Rock.....	\$20.00 @ 24.00-4 mos.
Southern and Western Brands.	30.00 @ 35.00-4 mos.

ORE.	
Lake Superior.....	8.50 @ 10.00-cash.
Virginia Hematite (Washed).....	4.25 @ 5.00-cash.

ST. LOUIS.

Specially reported by Messrs. SPOONER & COLLINS, Iron Commission Merchants, 217 North Third street, St. Louis, under date of Aug. 23: We note no material change in the condition of our market since our last report, though we think trade has improved a little, and we look for a much better demand for Pig Iron in the course of a week or two. Prices still low. We quote same as last:

	No. 1.	No. 2.	Mill.	White and Mott'd
Missouri Stone Coal.....	\$23.00 @ 24.00	\$21.50 @ 22.50	21.50 @ 22.50	22.00 @ 23.00
Missouri Charcoal.....	23.00 @ 24.00	21.00 @ 22.00	20.00 @ 21.00	19.00 @ 20.00
Tennessee Charcoal.....	23.00 @ 24.00	21.00 @ 22.00	20.00 @ 21.00	19.00 @ 20.00
Southern Coke, very soft and strong.....	24.00 @ 25.00	22.00 @ 23.00	21.00 @ 22.00	20.00 @ 21.00
Hanging Rock Charcoal	24.00 @ 25.00	22.00 @ 23.00	21.00 @ 22.00	20.00 @ 21.00
H. R. Charcoal, Cold-short.....	24.00 @ 25.00	22.00 @ 23.00	21.00 @ 22.00	20.00 @ 21.00
Extra.				
No. 1.	No. 2.	No. 1.	No. 2.	No. 2.
Hanging Rock Coke.....	25.00 @ 26.00	24.00 @ 25.00	23.00 @ 24.00	22.00 @ 23.00
West Virginia, Coke.....	24.00 @ 25.00	23.00 @ 24.00	22.00 @ 23.00	21.00 @ 22.00

COLD-BLAST CHARCOAL—All Numbers.	
Hanging Rock.....	\$25.00 @ 28.00-4 mos.
Tennessee.....	25.00 @ 30.00-4 mos.
Kentucky.....	25.00 @ 30.00-4 mos.
Missouri.....	25.00 @ 30.00-4 mos.
Georgia.....	25.00 @ 30.00-4 mos.
Alabama.....	25.00 @ 30.00-4 mos.
Assorted Bar Iron.....	1.00 per hundred
No. 1 Railroad.....	1.00 per hundred
Machinery Scrap.....	80c.
Heavy Cast ".....	65c.
Light Cast ".....	55c

and our government is making an effort to place France on the same favorable footing. Copper.—The famine in British India seems to have the effect of diminishing the demand for manufactures of Copper and yellow metal, and consequently tends to weaken the London market already affected by the unfavorable statistical position explained by us in our last review. There is little doing here, and prices are but feebly supported at the following quotations: Chili Bars, 182.50 francs the 100 kilos.; Common ditto, 177.50; Ingots and Slabs, 182.50; Best Selected English, 185 and pure Corocoro Ore, 185. Havre is unaltered except as regards first brands Chili Bars, which are weaker and obtainable at 182.50. Paris conditions. Good current remain 180 to 182.50 and Lots and Urments 177.50 to 178.75. Marseilles is depressed by the state of war in the East, and may remain so for an indefinite time. Some Egyptian Copper coin is reported sold at 152.25 net. They quote Red Tokat, 177. Small Refined Ingots, 175 to 180; Sheathing, 210 Bolts, 215, and Yellow Metal Sheathing 205. Tin.—The uncertainty as to the possible supply to come from Australia during the remainder of the year tends to check a recovery in values, both in England and on the Continent. Nothing has transpired here. We quote Banca, 186 francs the 100 kilos.; Billiton, 180; Straits, 175; Australian, 176.25; and English 177.50. Marseilles is remarkably quiet, and prices are as good as nominal; they quote Banca, 180; Straits, 175 to 177.50; Billiton, 180 to 185; and English, 190. Lead.—The tendency continues slightly downward. The market is quiet, and the decline, French, Belgian and German being at 50.25 francs the 100 kilos., and English and Spanish, 49.75. Havre is nominally 50.50 to 51. No improvement at Marseilles, where, on the contrary, First Fusion now offers at 45 to 48.25, and Second ditto at 47.75; Sheet and Tube, 54; and Shot, 53.50. Spelter.—Great ease is still the characteristic of this metal, although here prices are sustained at 50.50 francs the 100 kilos. for Silesian, deliverable at Havre, and other good brands, to be delivered here, at 50.25. At Havre nothing transpires, the quotation remaining 50.50 to 51.50 for Silesian. Marseilles unaltered, no sale is reported. Iron.—Not much of a revival is as yet observable, but the works whose prices were raised of late have thus far succeeded in maintaining them where they are, and may yet see the Champagne district follow their example. Carriage hardware is in good request. In the Haute-Marne, Coke Sheet Iron of best quality sells at 172.50 to 175. For thin Sheet Iron a good many orders are dropping in. In the Meurthe and Moselle, Merchant Iron is worth 170 francs, but affluence Pig Iron is weaker, and as low as 72.50 has been offered for the same. In the Ardennes, Merchant Iron commands 180. In the Haute Loire, business is quiet so far as the supplying of the trade and the railroads are concerned, but the government is giving orders of some importance. Coal is inactive, and likely to remain so for some months. The ironmasters seem to be hesitating to buy from hand-to-mouth. The departments of the North, the Pas-de-Calais and Loire districts extract and sell little.

IRELAND.

BRUSSELS, Aug. 12, 1877.—Iron.—Nothing of special interest has occurred during the week beyond adjudications. People on Wednesday attended the Metal Exchange in this city, and on Tuesdays at Charleroi prices are better sustained. In the neighboring grand duchy of Luxembourg Pig Iron is down to 48 francs. People in the Iron trade in Belgium do not entertain very sanguine expectations respecting the coming fall campaign. For the past four years have been hoping from one season to another for a revival, but the continual disappointments to which ironmasters have been subjected have toned them down very much. At a recent adjudication 1300 tons of Iron Rails went at 15 francs, cash, which is equal to 122 at the works. Another lot of 3000 tons was knocked down at 132 francs per ton, at the works, payable 25 per cent. in cash and 75 per cent. in old rails. Of Steel Rails 1000 tons were adjudicated at 167.50 francs, the lowest figure, the highest asked having been 180. In May the government paid for Iron Rails 138.15, at the works, and Steel Rails, 185. An order has been received from Spain for 20,000 tons of rails. Coal.—The government is in the market for 200,000 tons of coal for the state railroad, deliveries to commence October 16, 1877. This is a large quantity, and the government shows foresight in looking for a supply early in the season. We advise private consumers to do the same, and abandon their hesitating policy. Our different districts are inactive for the moment.

GERMANY.

HAMBURG, Aug. 12, 1877.—Metals.—Business as yet remains but slowly in the Metal trade. The decline in Metals all over the world, if we except the short improvement in Lead, has been almost uninterrupted since the commencement of the year, but the losses have been sustained more exclusively in the ports where the stocks had been allowed to accumulate, the inland dealers and consumers holding comparatively little, and this is still the case. The least revival in the demand for actual consumption of a genuine and lasting kind will therefore find the Metal trade at ruling low figures in a very good position in the interior of the country, adding thereto the steady requirements of Russia for trade and war purposes, and it can easily be perceived that the future is if anything rather encouraging than otherwise, the more so as money is easy and crops are abundant. Copper.—Little in the way of dealings can be reported for the week. Prices favor buyers. Berlin is weak, and the different sorts are procurable at 76 to 84 marks the 50 kilos. No change here. Drontheim, 80 marks. The market has been severely paralyzed by reason of the unfavorable statistical position and the apprehension of large Australian shipments. Berlin quotes Banca, 74 to 74.25, and English, 73 to 73.25 marks the 50 kilos. Lead has kept tolerably steady; Tarnowitz, Harz and Saxonian are worth at Berlin 20.25 to 20.75 marks the 50 kilos. Spelter.—Stocks remain restricted, and business is thus impeded. At Berlin Silesian sells at 19 to 20 marks the 50 kilos., and in this city at 20.

HOLLAND.

ROTTERDAM, Aug. 14, 1877.—Tin.—Banca, to be delivered from lots of the late sale and the impending September auction, has been sold at 39.75 guilders the 50 kilos. Lead.—Hölgberg has receded to 12 guilders the 50 kilos. Of the Holland brand 25 tons sold at 11.75 guilders, and 35 tons Eschweil at 12.

Our English Letter.

Review of the British Iron, Steel, Metal and Hardware Trades.

(From our Regular Correspondent.)

SHEFFIELD, Eng., Aug. 13, 1877.

THE WAR

is still our leading topic, and we are not as yet tired of hearing of or talking about it—not to mention the formidable task of perusing the miles of newspaper comments upon its various phases and incidents. Since I last wrote on your behalf there has been no very decisive movement on either side, but such engagements as have been reported all appear to have resulted in favor of the Turks. It is evident, indeed, that the Russians can do little this year beyond holding, and it may be, clearing Bulgaria up to and including one of the Balkan passes. If they can manage this they will do well. Some people think they won't be able even to perform this part of the programme, and prophecy a winter camp north of the Danube for the Czar and his staff. Popular opinion in this country, I may say, is rejoiced at the Russian reverses, although the traders are troubled at the prospects of a long-continued war, and

THE TRADE OUTLOOK

is thereby clouded very seriously. A broad survey of the commercial horizon fails to reveal any break whatever, and even cursory observation of current matters tells

most plainly how dull every branch of business is—despite the seeming contradiction afforded by the Board of Trade returns for July, which show a slight increase in the value of our exports as compared with last year. In no direction, nevertheless, can one hear of activity or of orders being in hand which will carry on works a little ahead of the present, with the exception of a few railmaking concerns, and at one or two establishments where patented specialties are made. These exceptions, however, rather illustrate the force of the general rule than anything else, and stand out as prominently as do the pyramids from the dead level of the Egyptian deserts. The only consolation we have is that trade is, at all events, being conducted on a really sound basis—a fact which may fairly be inferred from the very few failures of large caliber which have recently characterized the iron trade.

THE COLORADO BEETLE

has at length reached our shores, per Spanish steamer Carolina, from New York for Liverpool. A specimen was seen in the cabin by a Liverpoolian, and he carefully secured it alive. It was then duly and officially identified, and an eminent entomologist was subsequently sent down to Liverpool to investigate. An Act of Parliament has also been passed which is specially leveled at the peripatetic beetle tribe, and gives power to the Privy Council to make orders for preventing the introduction into Great Britain of "the insect designed as the Doryphora Decemlineata and commonly called the Colorado beetle." Any person found in possession of the living insect may be fined £10, and crops in which the insect may be found will be destroyed and compensation provided.

MR. BRIGHT ON AUSTRALIAN PROTECTION.

Mr. John Bright, the great Liberal leader, friend of Cobden and a thorough free trader, having been charged with saying that the State ought to grant bonuses to certain industries in Australia and Canada, has written in correction of the report—as circulated in a speech made by the Hon. John Young, of Montreal, on the occasion of a dinner given by the Melbourne Chamber of Commerce—as follows:

"DEAR MR. POTTER: I thank you for sending me Mr. Langton's letter of the 10th of June from Melbourne. By the same mail I have three other letters on the same subject on which Mr. Langton has written to you, one from the secretary of the Free Trade League of Victoria, one from Sir Charles Gavan Duffy, and one written at Suez by Mr. John Young, of Montreal, to whom the dinner at Melbourne was given. I need not tell you that I am surprised and amused at the stir which so small a matter has caused among our friends on the other side of the globe. I recollect meeting Sir Charles Gavan Duffy on his visit to this country, but I have not the least recollection that we had any conversation on the subject of protection, or on the policy of the Province of Victoria on that question. If any such conversation took place, I can say with confidence that my views have been entirely misunderstood and misrepresented by Sir Charles. The words he puts into my mouth are very much like in meaning to what I think I have seen in some of the writings of Mr. John Stuart Mill, and it may be that Sir Charles may have inadvertently attributed to me what he has heard from Mr. Mill or read in some of his works. If a government voted a sum of money to support a steam-boat enterprise which was deemed of great service to the country, but which from its novelty or its risk private capitalists would not undertake, I should say in doing this no sound principle would be broken, and that the public interest might possibly be wisely served. So if a government thought that a new culture might be introduced into the country, such as the grape or tea, it might appropriate a sum of money to make that experiment, leaving its future progress or fate entirely to the industry and disposition of the people. But to enact a tariff imposing heavy duties on important articles of import, to establish an oppressive and costly system of custom houses, to build up special interests before their time, or industries which might never thrive in the free air of competition, at the expense of taxation upon the whole people, levied partly at the custom houses and partly by the high prices which are sought to be obtained on the home-made and protected article, is a policy so unsound and injurious that I am greatly surprised that any one in the least acquainted with me or my life should have supposed it possible that I should give it my support. Englishmen form colonies at a distance from the mother country. They throw off many of the superstitions which are still to a large extent cherished in England. In respect to protection by means of a prohibitive or restrictive tariff the colony of Victoria clings to a superstition or error which we in England have abandoned. Our experience is conclusive as to the wisdom of our policy. Victoria is young, and thinks she knows more and better than we know. But when she finds herself not at the head but at the tail of the great Australian communities as to her success and the growth of wealth, she may discover that industry has no greater enemy than a protective or restrictive tariff. If you will kindly send this letter to your correspondent, Mr. Langton, it will not be necessary for me to write to Sir Charles Duffy or to the secretary of the Free Trade League of Victoria. Believe me, &c., JOHN BRIGHT."

Nobody can preach free trade better or more forcibly than Mr. Bright, whose honesty of opinion nobody can for one moment doubt, yet who is, after all, a partial witness because he is a British manufacturer and doubtless trades largely with Australia.

IRON AND STEEL RAILS.

During the seven months ending July 31 we exported 126,684 tons of steel rails, as against 63,737 tons last year up to the same date, but, on the other hand, we have only sent off 112,427 tons of iron rails, as compared with 133,063 tons last year, thus proving that steel is rapidly replacing iron.

BRITISH SHIPPING

is still on the increase—a fact further confirmed by the latest report of the Registrar General of Shipping: "The aggregate ton-

nage of registered vessels existing on the registry has risen from 7,297,984 tons in 1866 to 7,964,578 tons in 1876. In the United Kingdom, from 5,692,010 tons to 6,197,968 tons; and in the British Plantations, from 1,518,647 tons to 1,761,245, the Channel Islands showing a decrease from 87,327 tons to 65,365 tons. The number of vessels has fallen from a total of 40,922 to 37,680, and the number of men in 1876—namely, 348,959—shows very little increase.

THE "WORK AND WAGES"

heading of the daily papers is just now pretty well supplied with paragraphs, by reason of the disputes existing in the different parts of the country. A telegram this morning states that 1400 men have struck for an advance of wages at the Nantyglo and Blaenau collieries, South Wales, and that "great excitement exists in the neighborhood." At other pits of the same district disputes "exist." The strike of the Manchester and Salford joiners has now lasted fifteen weeks, the number of men out being 800. The committee of strikers in this case held a meeting on Saturday, in order to discuss the question of the importation of carpenters and joiners from New York, a number of "trade communications" from the society in that city being laid before the meeting. This question, I hear, may lead to trouble shortly. The men at the Mapperley, Kilburn and Rutland collieries, Derbyshire, have accepted reductions of wages. There is much distress among the Warwickshire weavers of ribbons, &c. The strike of London masons continues, as also does the dispute with the Clyde shipbuilders and the Five miners. In East Scotland all the operatives' wages will be lowered 5 per cent. on Thursday, August 16. Mr. Macdonald, in dealing out his customary weekly (and weekly) advice, has told a meeting (at Pontefract) of 20,000 miners and others that the sole cause of the present depression of the iron and coal trades is "the large output consequent upon the greater number of pits sunk and the limited demand."

THE BOARD OF TRADE RETURNS just issued, showing the quantities and values of our exports during the month of July, are rather more encouraging, inasmuch as they show an increase of about 9 per cent., as compared with the same month of last year. The total value last month was £17,537,301, as against £16,084,587 in July, 1876. A glance over the leading items shows that there was no increase in small firearms, unwrought steel and some other articles—such as machinery—but that there was a fair expansion as regards hardware and cutlery, brass manufactures, coal, pig iron, bars and angles, railroad iron, iron and steel wire, hoops and sheets, lead, plated wares, telegraph wires and unwrought tin. The leading quantities and values are as under:

	1876.	1877.	1876.	1877.
Firearms (small No.)	19,153	17,147	£21,069	£17,562
Brass, manufactures of	6,680	9,460	35,259	43,324
Unwrought steel, small articles	46	28	30,248	3,703
Railroad iron, bars and angles	529	83	45,163	4,259
Coal, &c., in bulk	1,562,377	1,586,307	851,132	798,909
Cop. unwrought	13,611	18,705	50,613	72,874
Cop. wrought	17,186	18,906	79,275	81,826
Hdw. & cutlery	79,056	81,954	288,453	306,683
Iron, pig, tons	18,309	21,151	152,835	166,492
Bars and angles, &c., tons	41,702	52,375	367,763	406,653
Railroad iron, bars and angles, &c., tons	3,065	4,432	51,493	63,281
Hoops, &c., tons	16,927	17,223	236,492	233,187
Tin plates, tons	11,103	12,158	234,304	240,244
Cast or wrought iron, tons	21,744	26,457	343,082	334,006
Old, for manufacture, tons	3,089	3,609	12,304	13,822
Steel, unwrought, tons	2,175	2,099	73,705	67,776
Mnufcs of steel or iron, tons	1,954	1,100	65,611	70,642
Lead—Pig, rolled, &c., tons	1,768	4,116	39,568	87,790
Steam engines, &c., tons	193,550	187,885	437,285	437,285
Plate and plated and gilt wares	16,614	17,759	17,759	17,759
Cutlery, &c., &c., tons	24,988	113,123	113,123	113,123
Tin (unwrought) &c., tons	7,782	9,205	30,750	33,778

STEAM ENGINES.

	1876.	1877.
To Russia	23,498	9,322
Germany	7,324	19,812
France	2,827	1,825
Spain and Canaries	13,099	11,557
Italy	18,710	3,226
Belgium	3,246	655
Brazil	13,700	3,703
British India	11,878	39,982
Australia	17,566	17,378
Other countries	81,705	78,108
Total	193,550	187,885

OTHER MACHINERY.

	1876.	1877.
To Russia	75,026	46,634
Germany	38,070	66,065
Holland	22,005	14,794
Belgium	34,068	22,071
France	38,017	43,005
Spain and Canaries	20,471	35,865
Egypt	2,416	3,276
United States	10,280	11,922
British India	50,417	49,293
Australia	25,138	26,151
Other countries	108,468	118,279
Total	462,746	437,285

HARDWARE AND CUTLERY.

	1876.	1877.
To Russia	7,317	2,368
Germany	17,400	16,926
Holland	9,384	7,199
France	10,800	9,107
Spain and Canaries	11,764	10,913
United States	29,718	26,061
Spanish West India Islands	5,555	14,768
Brazil	20,845	21,608
Argentina Republic	7,463	4,828
British North America	13,436	14,023
British India	21,158	31,170
Australia	42,533	40,606
Other countries	91,058	99,076
Total	288,451	306,683

"FIRES" have not been quite so frequent during the past week, although in at least one case the result has been most serious. This was at or near St. Just, near Penzance, in Cornwall, where five of the seven sons of a miner were burned to death in bed, the father being at a prayer meeting at the time. At Batley, Yorkshire, the Park Lane cloth mill was destroyed on Saturday, the loss being estimated at £20,000 to £25,000. At Wincanton, Somerset, the Town Hall and Market-house were destroyed by fire on Thursday, the loss being some £4000. In London there have been numerous somewhat serious conflagrations.

SCOTCH PIG IRON

has been steady, and the coming into operation of the restricted production has been marked by a slight increase in makers' prices. There are now 152,089 tons in Connal's stores, an increment of 2079 tons during the past week. After this it will be interesting to note whether the smaller output will allow of any surplus going into the stores. There has been no change in freights or in the price of ballast pig iron. Writing on August 10, evening, from Glasgow, Messrs. James Watson & Co. said:

The market for Scotch pig iron warrants opened this week at 55 1/2 per ton and remained comparatively steady until to-day, when it advanced to 55/5, cash, closing buyers thereat, sellers 55/6. Makers' iron is firmer in price, in several instances at an advance. Shipments last week were 8241 tons, against 8650 tons in the corresponding week of 1876. We quote:

	No. 1.	No. 3.
G. M. B., at Glasgow	56/9	53/6
Gartsherrrie, "	63/6	55/6
Coltness, "	68/6	58/
Summerlee, "	60/6	55/
Langloan, "	63/6	55/6
Carbarnock, "	57/6	54/
Calder, at Port Dundas	60/	54/6
Glenarnock, at Ardrossan	60/6	58/
Eglington, "	56/6	53/
Dalmellington, "	56/6	54/
Shotts, at Leith	61/6	56/
Kinnell, at Bo'ness	57/6	52/6

The prices of John E. Swan & Brothers (Limited), same date, are:

	No. 1.	No. 3.
Gartsherrrie, No. 1	62/6	58/6
Coltness, "	68/	60/
Glenarnock, "	60/	55/
Eglington, "	56/	52/

Messrs. Wm. Colvin & Co.'s quotations are similar to the foregoing.

MIDDLESBOROUGH (CLEVELAND) IRON TRADE.

I make the following extracts from the monthly report of the Middlesborough Chamber of Commerce:

Pig Iron.—In the Middlesborough district the number of furnaces in operation was 76 of go built, and one furnace was in course of construction at the Newport Iron Works of Messrs. B. Samuelson & Co. The furnaces in operation were increased by the blowing in of Messrs. Bolckow, Vaughan & Co.'s furnaces at Eston. The following are the statistics: Make, July, 1877, 124,690 tons; do. 1876, 100,113; do. June, 1877, 121,459; increase on July, 1876, 15,577; increase on June, 1877, 3,231. The stock of pig iron in makers' hands was: At June 30, 1877, 132,802; July 31, 1877, 135,783; increase, 2,981 tons.

In the warrant stores an increase of 917 tons was shown. The quantity in the stores (which have been taken over during the month by Messrs. Connal & Co., of Glasgow) was 16,617 tons, but part of this was at Darlington, and in addition the railway company had 1600 tons stored. The shipments from the port of Middlesborough were:

	July, 1877.	July, 1876.
Foreign	30,891 tons	26,474 tons
Coastwise	39,403	26,709
Total	70,294	53,183
Increase for July, 1877	17,311	

Of the foreign shipments 7662 tons went to Germany, 3990 tons to Belgium, 5405 tons to Holland, 9028 tons to France, and the remainder to Sweden, Norway, Russia, Denmark and Portugal. Of the coastwise shipments no less than 22,394 tons went to Scotland. The trade during the month was in an unsatisfactory condition, and makers' prices were weak during the first two weeks. No. 1, G. M. B., is quoted 45/; No. 3, 41/; No. 4, Foundry, 40/6; No. 4, Forge, 40/6, less commission. Nearly all the business transacted is done at these rates.

The finished iron trade was languid throughout the month, and there was no sign of activity in any department. The plate mills have had a tolerable supply of orders to work off, but the prices at which these orders have had to be taken were anything but satisfactory. At the beginning of the month £6. 17/6 and even £7 could be got from consumers, but at the end £6. 12/6 was about the utmost that could be obtained for ordinary ship plates. The rail trade is practically at a standstill in this as well as in other parts of the North of England. The Britannia Iron Works, with over 100 puddling furnaces, are quite stopped. Bar manufacturers have been obtaining small orders, but have not been able to keep their works regularly going, and £5. 17/6 is now the current quotation.

The engineering works have been doing but a small trade, and share fully in the depression which affects the district.

The iron shipbuilding business has not been so brisk of late on account of the unsatisfactory condition of the shipping trade. In the whole of the Cleveland district there are 109 furnaces in operation, which produced 180,799 tons during July. The exports were about 70,000 tons, and the stock on July 31 was 250,538 tons. Bolckow, Vaughan & Co. have now blown in their third furnace for making Bessemer pig, of which they are in a position to produce 1500 tons weekly.

TRADES OF SHEFFIELD.

The statements which appear to have been put into circulation to the effect that there has been a "great increase" in the price of iron during the past week or so, are, as a matter of course, exaggerated, and bear no close relation to the actual facts. As was stated by me last week, there has been a slightly firmer feeling in some branches of the pig iron market, although as a strict matter of fact, other kinds of pig have given way, nominally at least, by a more than proportionate amount. The private circular of one of the best known firms in the locality, not only selling but producing pig iron of good repute, says: "We cannot record any

improvement in the trade, though prices of pig iron are slightly firmer, owing to the restricted production. The demand for finished iron is very quiet, with no signs of anything better." This is the statement of a large firm engaged in everyday business, and I can only add that it is fully borne out by my own experience and observation. Most of the north-country brands, and some of those of this neighborhood, have hardened to the extent of a shilling or so per ton, but it is not possible in the present state of trade, and until the stocks elsewhere have been very materially reduced, for the smelters to command any serious increase. The market will not bear the increment, and buyers will not bind themselves beyond the immediate future if they can possibly help it. That this is so is corroborated by a report which comes to me from the North Lincolnshire district, and which says the pig iron market there is in a prostrate condition, smelters having the greatest difficulty in getting orders, even at the barest possible quotations. The effect of this is that large quantities of iron are being put out to stock, and further furnaces are likely to be put out, although there are, says my informant, even now only nine furnaces blowing out of the twenty-three built. Of these, seven are owned by the Trent Iron Company, four by the Frodingham Iron Company, four by the North Lincolnshire Iron Company, four by the Appleby Iron Company, two by the Lincolnshire Iron Smelting Company, and two by the Redbourne Hill Company. The prices of the district are now about 57/6 for No. 1 Foundry, 52/ for No. 3, 47/6 for No. 4 Forge, and 46/6 for M. and W. all f. o. r. at Frodingham. I have also to note a drop in the nominal prices of some hematite producers to the extent of half-a-crown per ton, although from what I hear this reduction has been fully discounted by some buyers for some time past. The new figures for Millom Bessemer are now No. 1, 70/; No. 2, 67/6; and No. 3, 65/; Ordinary, Nos. 3, 4, and 5, being also now placed at 65/. Even these prices, and those of other West Coast smelters, are doubtless only nominal, seeing that at least one large cash buyer hereabout is said to be obtaining deliveries at lower rates. This must, or at any rate ought, to be the case, otherwise certain of the Bessemer steel producers of this district are making rails at prices which do not appear to be remunerative. Steel rails, drilled and all complete at £6. 10/ and under per ton can hardly pay unless the first processes are got through advantageously. In this connection I may say that I hear statements relative to a certain recent rail and fastening invention which is calculated to make manufacturers of a particular sort of railway requisite rather uneasy. The invention has made such good progress that a practical and thorough trial is about to be conducted on two of the busiest pieces of railway in this part of the country.

This invention is that of Mr. Acaster, of Sheffield, and is described in specification No. 4884. It claims to entirely supersede the present fishplate-and-bolts connection by means of a sheath and grooved wedges which make a sound, safe and elastic joint. The cost of the new joint will be about £12 per ton, whereas the bolts and plates cost £27. In the cast steel trade matters remain on a very quiet basis, and the most keenly directed efforts of travelers do not suffice to bring in other than very small orders. The best markets in the home trade are Scotland and Lancashire, while the foreign markets are alike much below par. I hear of a Russian order for best cast steel wire spiral springs, being in course of execution here, and that there is, generally speaking, a very fair demand for steel wire of all descriptions, partly for telegraphic purposes, partly for cables, and the balance for colliery winding ropes or for bridge building purposes. The American customers and good local firms are still numerous, and they take regular consignments of steel for tool making and cutlery uses, but now and for some time past their orders have been for exceedingly small lots, although in some instances for many varieties of sorts and shapes.

At the half-yearly meeting of the Yorkshire Railway Wagon Company, at Wakefield, on Friday last, a dividend of 10 per cent. was adopted. The annual report of the directors of H. & S. Barker & Co. (Limited), Mexborough, shows a loss of £368 on the year's working, which is attributed to the depression of trade, the continued high state of wages, and the short hours system

traveling trunks and baths and toilet ware thus far has been much below the average. For the moment, the orders run chiefly upon trays, cash and deed boxes and coal vases. Edge-tool makers for the most part continue well employed on Indian and other orders. There is a little now doing in the lamp trade. There is no general improvement to report in the jewelry branch, but individual firms here and there report less stagnation. The gilt jewelry branch also may be reported a shade better. In the button trade ivory goods continue in strong request. The steel toy trade is quiet. Prices all round are steady.

SOUTH WALES AND MONMOUTHSHIRE.
The iron trade of these districts is rather better, last week's shipments having been 6000 tons, of which there were 4000 tons of rails from Cardiff. Of these rails 1600 tons were for Bolivia, 1100 for Christiansa, 800 for Gothenburg and 500 for Santos. At Blennavon a heavy iron rail order has been secured and at Llynvi a good bar order for Malta. At Penttyrch Tin Plate Works, Dutch orders are in hand. At Gadlys, coke plates are 18/6 per box and at some other places 18/. A hope is expressed that the Great Western Railway Company may acquire the now dormant Plymouth Iron Works for its own use, the company having placed orders for 100,000 tons of rails within two years past. Last week 20 barrels of nails from Antwerp arrived at Swansea, to the great astonishment of the native iron and hardware men. The coal trade appears to have revived a little, last week's shipments having reached nearly 100,000 tons. The Crom Avon Works, Glamorganshire, formerly worked by the Governor and Company of Copper Miners of England, have been acquired by the Copper Miners' Tin Plate Company (Limited), which has a capital of £84,000 in £50 shares, and has the following gentlemen as the "first subscribers": Henry Nash, Tower Buildings North, Liverpool, merchant; Elisha Smith, same address, merchant; James Whatman, London; Philip William Flower, Briton Ferry, Glamorgan, manufacturer; Robert V. Leach, Devises; F. D. Wickham, Bath, and H. A. Bartlett, Great Yarmouth.

THE METAL MARKETS
have been very quiet, with a small amount of business doing.

Von Dadelzen & North report: "Copper unchanged. Chili bars, G. O. B., £68. 15/ to £69, with little doing. Wallaroo cake sold in small lots at £80; Burra, £75 to £75.5; English tough, £74. 10/ to £75. 10/; select, £76 to £77; Sheets, £81. Tin very dull; prices about 10/ lower. Of Straits there are sellers at £66, and Australian has been sold at £65, and still offers thereat. Dutch market very dull; Banca, 41½; Billiton, 39½. English ingot, £70 to £71. Tin plates quiet. Lead dull; £20 to £20. 7/6 for English; £20 for soft Spanish. Spelter dull; quoted £19. 5/ to £19. 10/ for ordinary brands, and £20 for special brands. Quicksilver quiet; the importer still quotes £9. 10/; small second-hand lots sold at £9. 2/6 to £9. 5/. Antimony, £48."

London official closing report of the Lombard Exchange, August 10th (evening): "Copper firm; about 600 tons of Chili bars on the spot, Swansea and Liverpool, sold at £68. 15/ and £69; Wallaroo, £80, and Burra, £75 to £75. 5; English tough, £74 to £75. 10/; best selected, £76 to £77; sheets, £81. Tin dull; Straits quoted £35. 10/ to £66; Australian sold at £64. 15/; English ingots, £70. Scotch pig iron firm at 55/4½, cash; 55/6 one month. English pig lead, £20 to £20. 7/6; soft Spanish without silver, £19. 17/6 to £20. Spelter quiet at £19. 5/ to £19. 10/. Quicksilver, £9; Antimony, £48."

The Mining Journal remarks: "Copper.—A fair inquiry has existed for Australian, but chiefly for Burra, owing to the scarcity and dearth of Wallaroo. Burra is now the cheapest kind of copper to be met with in the market, but there is comparatively little to be obtained, and unless buyers come forward quickly they will certainly have to pay dear prices for it, as there is good room for a considerable rise in the market quotation compared with Wallaroo, and holders are very firm, and well able to maintain their position; £80 per ton has been realized for Wallaroo. Lead.—Our market has been very quiet, and the tendency seems to be slightly in favor of buyers. Quicksilver.—The price in first hands has been reduced to-day to £9, but there is not much doing, and second-hand lots have been selling fully 5/ per bottle below the fixed price. Spelter.—The market is quiet, and prices continue easy. Tin Plates.—A fair business is doing for some markets, but the demand is not general. For America the shipments are satisfactory, but for the Mediterranean orders are scarce. Tin.—This market continues to droop, and there seems to be more pressure to sell now than for some time past; holders are evidently losing confidence in the market, and think it better to realize at once rather than take the risk of holding any longer."

No change at Liverpool.
Iron, f. o. b. in Liverpool, per ton.
E. & A. D. E. & A. D.
Merchant bar..... 6 10 0 to 6 15 0
" in Wales..... 6 0 0 to 6 5 0
Staffordshire..... 7 0 0 to 9 15 0
Hoop..... 7 10 0 to 8 10 0
Sheet..... 8 15 0 to 9 15 0
Nail rod..... 7 0 0 to 7 10 0
Bar, best crown..... 7 0 0 to 8 0 0
Boiler plates..... 9 0 0 to 10 0 0
Tin Plates, f. o. b. in Liverpool, per box.
E. & A. D. E. & A. D.
Charcoal, I. C..... 1 2 0 to 1 4 0
Coke, I. C..... 0 18 0 to 1 0 0
Copper, delivered in Liverpool, per ton.
E. & A. D. E. & A. D.
Bolt and sheathing..... 82 0 0 to 0 0 0
Tile..... 75 0 0 to 0 0 0
Tough cake..... 76 0 0 to 0 0 0
Best selected..... 77 0 0 to 0 0 0

Steam Boilers and their Management.

Steam boilers are coming into such general use, through the introduction of steam-heating and small engines, that the management and care of them is a matter of general interest to a very large class of our readers. Mr. Roper, in his book on the Steam Boiler, has a great deal that is of value upon the subject. In speaking of boiler explosions, he says:

The sooner steam users and engineers discard all theories in connection with steam-boiler explosions, and come to the conclusion that when a boiler explodes one of two

things is certain—either that the pressure was too great for the boiler, or that the boiler was not equal to the pressure; that it gave way in the weakest place, and that the strength of any machine (the steam boiler included) must be measured by its weakest point, and that the sooner this principle is universally recognized the better it will be for every steam-using community. A weak spot, a flaw, or a crack in a boiler does not improve by use, and when any machine breaks down at a point which shows that it must have been weak for a long time, no one thinks of going into a long discussion or explanation of the mysterious agencies which were suddenly brought to bear on it and cause it to break. Not so, however, with a steam boiler; it may have been burned, corroded and cracked for years, and when at last it explodes there are always to be found those who wish to involve the whole thing in mystery and tell how it must have occurred, who are always unable to tell how it might have been prevented.

Within the past eight years, mainly through the operations of the Hartford Steam Boiler Inspection and Insurance Company, steam boiler explosions have been stripped of the mystery in which visionary theorists had so long enshrouded them, and the belief in this heresy as mysterious steam boiler explosions is principally confined to those who are incapable of or unwilling to be convinced, even when the facts are laid before them. The class of persons of all others that ought to encourage such theories and take refuge behind them, when called upon to pay damages in case of accident, are those who discard such theories when accounting for boiler explosions, and the correctness of their views is sufficiently attested by the almost entire absence of serious accidents in connection with the thousands of boilers of all sorts and conditions that are or have been in their care for several years past.

Few have any idea of the extent to which steam is used in our large cities, or of the risks to which even those who have no interest in the boilers, and who are not connected in any way with the business in which they are used, are exposed. In almost every building along our principal thoroughfares may be found a large boiler, used for heating purposes or for furnishing power, which is concealed from public view. It is only when the public are startled by an explosion, and by the death or injury of innocent persons, that the true condition of things is revealed, and that the dangers incurred by every passer-by are exposed.

Further on he says: No class of men are intrusted with greater responsibilities, none hold in their keeping more important interests of life and property, than those having the charge of steam boilers. A mistake in judgment at a critical point, or a careless neglect of duty, may cause, and has often resulted in, terrible destruction to life and property.

Although the management of a large boiler needs a great deal of skill and care, an intelligent and careful man may easily qualify himself to take charge of a boiler and run it with safety and economy.

A very mischievous practice exists in various parts of the country in reference to starting fires under steam boilers preparatory to raising steam. This duty is intrusted to ignorant watchmen, who are too often the agents of disaster. These men are instructed to light the fire at a certain hour, and comply with their orders without exercising the least judgment on the subject. Numerous instances are on record where watchmen have started the fires under steam boilers and raised steam before discovering that there was insufficient water in the boilers, thus incurring the risk of burning the boilers, if not actually ruining them. No persons ought to be permitted to meddle in any way with the steam boiler except those who are skilled in the management of them, and who are fully conversant with the properties of steam. Thousands of lives are lost and much valuable property destroyed through the ignorance of those left temporarily in charge of steam boilers.

We think the following directions will prove very serviceable to all who have any thing to do with a boiler:

The first duty of an engineer or fireman when he enters his boiler room in the morning is to try the boiler gauge cocks and ascertain if there is a sufficient supply of water. Many boilers have been badly injured from neglect of this precaution. Fires are often replenished, and when well started attention is directed to the water in the boiler. If from any cause during the night the water has escaped, the result may be a burned sheet or probably still more serious injury.

Too much reliance should never be placed on self-acting apparatus, such as gongs, floats, steam or alarm whistles, for regulating the height of the water in steam boilers, as, even if they act with certainty, they provide only against one or two contingencies, while the dangers to which steam boilers are exposed are numerous.

The glass water gauge, though one of the simplest, most beautiful and useful attachments of the steam boiler, should not be relied upon altogether to show the level of the water in the boiler.

The gauge cocks should be kept clean and in constant use, as they furnish the most reliable means of ascertaining the height of the water in a steam boiler.

The furnace door should never be allowed to remain open longer than is sufficient to clean and replenish the fire, as the contraction of the tubes and flues, induced by the cooling down of the furnace, has a very mischievous effect on all parts of the boiler exposed to the cold draught.

The feed water should be sent into the boiler as hot as possible, as, if it be forced in at a low temperature, it will impinge on that portion of the boiler with which it comes in contact, and, as a result of the continual expansion and contraction induced by the varying temperature of the water, the boiler is liable to crack and become leaky.

If, from neglect or any other cause, the water in the boiler should become dangerously low, the fire-draws and damper should be immediately thrown open, for the purpose of admitting the cold air to the heated plates, and the fire withdrawn as soon as possible.

Under such circumstances no attempt should be made to introduce cold water into the boiler, or disturb the safety-valve, as either might be attended with disastrous results.

The safety-valve should always be moved before the fire is started to get up steam, for the purpose of ascertaining if it is in good working order. It should also be raised whenever the boiler is being filled with cold water in order to allow the air to escape, as air has a tendency to retard the influx of the water, and also to occupy the steam room when steam is raised.

All new boilers should be thoroughly examined before being filled with water, to ascertain if there are any tools, wood, lamps, greasy waste, &c., left behind by the boiler makers, that would be liable to be carried into connections or cause the boiler to foam.

In getting up steam in boilers just filled with cold water, or that have been out of use for some time, the fire should be allowed to burn moderately at first, in order to admit of the slow and uniform expansion of all parts of the boiler; as, when the fire is allowed to burn rapidly from the first start, some parts become expanded to their utmost limits, while others are as yet nearly cold, thereby subjecting the boiler to fearful strains, induced by unequal expansion and contraction, which frequently results in leakage, fracture and sagging of the shell or flues.

When the weight is once fixed on the lever of a safety-valve, at the right point to retain the safe working pressure, the extra length of the lever should be cut off.

The feed supply and the firing should be as steady and as regular as possible, as frequent and extreme alterations of temperature, especially with boilers carrying a high pressure, or irregularities of any kind, have a very injurious effect.

Asbes should never be allowed to accumulate around the water-legs of fire-box boilers, or the water-bottom of any boiler, as wet ashes, like any other lye, corrodes, and eventually destroys the iron.

Boiler flues should never be allowed to become choked with ashes, nor the shells to become coated with soot, as it very much impairs the efficiency of the heating surface and induces a wasteful consumption of fuel. The flues and tubes of boilers should be swept out at least once a week. This is a very important object in point of economy, as, when the flues become choked with ashes, it requires an extra expenditure of fuel to generate the necessary quantity of steam. Care and attention to little matters in managing steam boiler fires will not only add to the working age of a boiler, but save materially in the consumption of fuel.

Boilers should never be filled with cold water while they are hot, as it causes contraction of the seams and stays, often inducing fracture of stays or leakage in the seams and tubes. The tubes of boilers being generally of thinner material than the shell, cool and contract sooner. For this reason, the boiler should never be filled with cold water while the tubes are hot.

One of the most common causes of deterioration in steam boilers, and also of leakage of the seams and under side, and at the junction of the tubes and tube sheets, is the reckless practice of blowing out the boiler while still hot and filling it again with cold water. Under such circumstances, the contraction of the crown sheet, tube sheets and tubes is so rapid and unequal, that, if persisted in, the result is the ruin of the boiler.

Mr. Roper's remarks in regard to the danger from a gradual increase of pressure when the engine is at rest deserve attention. He says: When an engine is stopped, if the steam should increase to an excessive pressure, the safety-valve should not be moved, as any sudden release of the steam might be attended with risk; it is better to open the furnace door, cover the fire with fresh fuel and turn on the feed water; this will have a tendency to lower the temperature and keep up the circulation in the boiler, so essential to safety when the steam is shut off and a hot fire in the furnace.

It frequently happens that boilers, which have been standing a long time with steam up, explode just after the engine has started. This usually happens where the boilers contain a large amount of water which has had an opportunity to become thoroughly heated. When the pressure is suddenly reduced a considerable portion of this flashes into steam at once, and throws, instantaneously, an enormous strain upon the plates, causing an explosion.

When boilers are to be cleaned they should be allowed to stand for several hours and cool before the water is run out; the deposit of mud and scale will then be found to be quite soft, and can easily be removed or washed out with a hose from all accessible parts. There is a very erroneous impression existing among engineers and steam users, that blowing out a boiler under a high pressure has a tendency to remove the mud or deposit; this, however, is a mistake, as the contraction of the different parts of the boiler, induced by so sudden changes of temperature, has a tendency to induce leakage of the seams and round the rivets and ends of the tubes.

It is a very general impression among engineers and firemen, and receives encouragement from those who sell nostrums for the prevention and removal of scale, that so long as the mud and deposit is retained in the soft and slushy state, it can do the boiler no harm. This is undoubtedly a mistake, as it retards the escape of the heat from the fire to the water, inducing overheating, which is generally followed by cracking and blistering of the plates and leaking at the seams.

The Modern Silversmith's Art.

Mr. Frederick Voss, in a communication to the *Tribune*, gives the following interesting information respecting the art of making hollow-ware in silver, as now practiced: "The process of hammering up a piece is very long, and consequently expensive, so it is only used for pieces of great value. A more rapid and cheaper mode of manufacture is employed for such pieces as tea pots, cream and ice pitchers, etc. The first operation is to transform a 'skillet' or ingot of silver into a thin sheet of metal. This is done by rolling. When the skillet, weighing about 250 pounds, comes from the foundry, where it has been made by pouring melted silver into a skillet mold, it is about 1½ inch thick, 8 inches long and 6 inches wide. It is then placed between heavy iron rollers; each roller is 3 feet long and from 10 to 12 inches in diameter. These rollers are horizontal and the space left clear between them is regulated by screws which when turned draw these large cylinders closer together. The moment the skillet is drawn in between the rollers it takes about 40 horse steam power to make them revolve. This enormous force ceases to be required as soon as the silver comes out, but will be needed again when, after a turn of the screws has brought the rollers closer, the silver is again passed through. This renders necessary great perfection of work in the governor of the steam engine, which must be capable of furnishing at any moment a large extra power which will be thrown off soon after without any alteration of the normal running speed. The skillet is drawn through the rollers repeatedly, and each time a turn of the screws, drawing them closer together, produces a corresponding diminution in the thickness of the silver. By repeated rollings it is clear that the metal, which is very malleable, will diminish in thickness while it spreads in length and breadth—and, at a given time, it will come out from between the rollers as a thin sheet of metal.

The mechanical process of 'spinning' is the next stage through which the silver is passed to make, for instance, a tea pot. A disk of metal of the required size is set on a spinning lathe, it is held in the center between two pieces of wood, one of which is used only to hold the silver in position, while the other represents the shape the silver has to be made into; this piece is named a 'chuck.' The lathe is now started, and the silver disk revolves with great rapidity. A workman armed with a burnisher, which is a tool over 2 feet long, including the wooden handle, now attacks the outer edge of the disk as it spins round, and using great pressure, brings the end of the tool, which is shaped like a round steel knob, in contact with the metal. The length of the tool—one part of which rests on a metallic bar, forming a part of the lathe, and technically termed a rest—gives the man a great power of leverage, and the silver disk, soon yielding to the pressure of the tool, is curved in, and, owing to the malleability of the metal, soon changes from the shape of a disk to that of a saucer, and eventually to that of a bowl. The operation is continued until the metal is made to fit close, or to 'hug,' as it is termed, the shape of the 'chuck.' This chuck, which is exactly of the shape to be assumed by the silver, is constructed in sections like a shoe-last, and by withdrawing the center piece can be easily removed.

When the operation of spinning is concluded, we have, for instance, two pieces of silver, which are intended to form the lower and upper parts of a teapot. These two pieces are taken to the silversmith, who will unite them to make the body of the teapot. To do this he takes a long band of silver, on one side of which a decorative pattern has been stamped by passing it through steel rollers, on one of which is cut the pattern to be reproduced. The pressure of the rolling prints the design on the silver. This band of metal is shaped into a circle, forming as it were the 'equator' of the teapot, and the two half shapes of the body are soldered to it. The spout, handle and cover, are next placed in the proper position, and the piece passes to the finishers. The finisher first removes all the inequalities of the surface with pumice stone, and when the outside of the teapot is perfectly smooth it is placed on a polishing lathe. The brushes of the machine are circular, and revolve with great velocity—over three thousand turns a minute. They are made of a great number of thicknesses of Canton flannel, cut out with a circular punch and then strongly fastened together at the center by wire clamps. Successive passages from one brush to another, the first one impregnated with oil and rotten stone, the last, covered with ordinary rouge, brings on the surface of the metal a smooth polish like that of a crystal mirror. In some cases a peculiar, dull surface, called 'satin finish,' is thought more suitable to the aspect of the piece. It consists in slightly indenting the surface of the silver with blows struck by hard wire brushes worked by steam which give the metal the appearance of being covered with a minute crystallization. Different colors of gold and metallic oxides are often used to decorate the surface of silver. Electricity is of much service to the manufacturer in all these operations, and in a future letter I shall give a full account of methods employed, both for coloring, gilding, and producing pieces by the electro-deposit of metals. Many pieces of hollow-ware are decorated with chasing, engraving and hammered work before they are polished. Silver walters are hammered out on large flat anvils, and the particular curve around the edge is produced with a 'swadge' hammer. The process of 'swadging' is very frequently used in the manufacture of tin and iron ware, and consists in hammering the metal with one hammer the face of which is cut like the profile of the curve to be given to the metal, which rests on a small anvil the same size as the hammer's head, and bearing the exact counterpart of the curve on the face of the hammer. The metal struck between these pieces of iron soon retains the form of the 'swadge.' Often an ornamental border of rolled silver is soldered on the edge of the ware, while the center is decorated with engraving. The very interesting manufacture of spoons and forks is worthy of special attention. I will describe it at some future time."

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In deciding the question of whether the salts of zinc are poisonous or not, facts are worth a great deal more than theories. We have frequently called attention to instances of zinc poisoning from the use of water conveyed through galvanized iron pipes, and a number of such cases have come under our own observation. We have also produced the first symptoms of zinc poisoning in ourselves by drinking, for purposes of experiment, water contaminated by contact with zinc surfaces. We now learn of a case which, though not the first of its kind, is interesting and should put workers in sheet metal on their guard. A stove dealer in Hartford has died of a slight cut made in one of his fingers by a piece of ordinary sheet zinc. The zinc inflicted a poisonous wound that in a few hours affected the whole circulation, and baffled the efforts of physicians who were then summoned. Oxidized zinc, which is found in numberless houses, should therefore be handled carefully. Zinc oxidizes readily, especially in damp places, and we think it safe to assert that all the salts of that metal are poisonous. Care in handling sheets is desirable under all circumstances.

Novelty in Railroad Construction.

The Alabama and Chattanooga Railroad, 295 miles long, has been in financial difficulties since the formation of the company in 1868, by the consolidation of the Northwestern and Southeastern Alabama Railroads. After passing through the hands of three receivers it was finally purchased by Messrs. Erlanger & Co., of London, for \$1,480,000. These gentlemen have issued a circular to the apparently apathetic first

mortgage bondholders of the company, offering to give them "another and final opportunity of participating in the purchase and covering their loss." It is estimated that \$570,000 will be required to put the road in proper running condition, and the expenses will foot up \$60,000, making \$2,050,000 to be paid in all. As the old bonds are mainly held in Europe, Messrs. Erlanger & Co. propose to form an English company, under the name of the "Alabama Great Southern Railway Company (Limited)," with the object of owning and working the road, and if the local law of Alabama will not permit this, to form an Alabama corporation, and to become substantially the holders of its shares. They design to issue a first mortgage bond of \$1,750,000 at 6 per cent. interest; 15,660 preferred shares of £10 each, bearing a cumulative interest of 6 per cent., extending to six years' arrears, to be increased *pari passu* with the dividend on the ordinary shares as soon as the earnings on the road are sufficient to pay 6 per cent. on the latter, and 156,600 ordinary shares of £10 each. The bondholders may, upon payment of 10 per cent., or £20 on each \$1000 Alabama and Chattanooga first mortgage indorsed bond of 1869, become entitled to two preferred shares and to 20 ordinary shares in the new railroad. After September 10, should any preferred shares remain unapplied for, bondholders may receive an excess allotment of both styles of shares on condition that they apply for them at the time of making their *pro rata* application. This option is not to interfere with the right of bondholders to participate in the benefits of the compromise made by the council of foreign bondholders with the State of Alabama, the State having guaranteed the bonds to the extent of \$16,000 per completed mile and siding. It is believed that the proceeds of the preferred shares will provide all the cash required, and that the balance can be paid in bonds. To the circular is appended a report by R. Jacob Hood, C. E., who was sent out to Alabama by Messrs. Erlanger & Co. to examine the road. He says it was in a frightful condition a year ago, but has since been so far improved that it pays a profit of \$23,000, with an expenditure of five times as much out of the earnings in reconstruction and repairs. Still, it is only as yet safe for slow trains by daylight, and can only be worked in short sections, so that three days are consumed in transit from one end to the other. It consequently does only a local business, though one of the shortest connecting lines for the transportation of through business in the South. Mr. Hood has great faith in the future of the road, if properly equipped and managed. His hopes are based partly upon the road's natural advantages and upon the "probability of improvement in the commercial and financial position of the Southern States." It is upon his estimates and recommendations that Messrs. Erlanger & Co.'s proposition is based.

Water Drinking in England.

A correspondent writes: "It is quite conceivable that a new supply of water for London will be forthcoming some day, and then a small fraction of a New River share would no longer be equivalent to a comfortable little fortune. It is wonderful indeed in this age of progress that a purer source for water than any we have yet been favored with for consumption in London has not been made available. The native element has fallen more and more out of use. Who drinks water nowadays? We once gave a valuable ice pitcher to a friend, and were rather disappointed never to see it on his table. At last we asked him what had become of it. 'Oh, said he, 'it is locked up somewhere.' 'Why don't you use it?' 'Use it! what for?' My dear fellow, did you ever see anybody drink a glass of water in England? It suddenly occurred to us that we never had—except women and children, and they will drink anything that comes first. Go where you will now, you will seldom be offered a glass of water. And even the old-fashioned aerated waters, the manufacture of which seemed at one time to be a lasting source of wealth, must have suffered not a little by the popularity of the new contrivance for 'laying the dust' in the throats of thirsty souls. The owners of some of these new springs must be making large fortunes, and perhaps they think their children will have an equally good thing of it. But the dear public is a fickle creature. Presently another wonderful 'spring' will be discovered, and we shall all run to it."

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The Boston sealers of weights and measures are detecting a good deal of cheating. In the last three weeks of June they tested 592 scales and 1000 measures, and found that 30 per cent of the measures, and 90 per cent of the scales were short. The latter work has proved fully as fruitful of fraud. One great trouble is that many dealers always use wine measure when the dry is the standard, thus cheating the customer a gill on each quart. The spring balance, however, is the chief sinner. It is almost invariably short, in one case five ounces to the pound, in another five and a half, and still another six ounces.

SAM'L G. B. COOK & CO.,

American and Foreign
Hardware and Cutlery Manufacturers' Agents,

Nos. 5 & 7 German St., - - BALTIMORE.

Represent and carry in stock a full line of the following manufacturers' goods, which we offer the Trade at manufacturers' prices and terms.

American Screw Co., Screws.
American Tea Tray Co.,
John Auer & Co., Wrought Goods.
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THE SCROLL SAW.

Length of arms..... 20 1/2 in.
Length of sweep for work..... 19 "
Height of table above floor..... 31 "
Diameter of table..... 6 "
Length of stroke..... 1 1/2 "
Diameter of driving wheel..... 12 "
Diameter of balance wheel..... 6 1/2 "
Diameter of emery wheel..... 3 1/2 "
Number of strokes of saw per minute..... 1,000
Number of revolutions of emery wheel per minute..... 1,000
These speeds are made with a tread of 150 per minute.
Weight of Scroll Saw, 30 lbs.

THE LATHE.

Weight..... 6 1/2 lbs.
Length of ways over all..... 15 1/4 in.
Distance between centers..... 9 "
Swing..... 3 "
Length of slide rest..... 4 1/2 "
Height of head and tail stocks above ways..... 2 1/2 "
Diameter of cone pulley..... 1 1/4 "
Number of revolutions per minute..... 7,000



THE CIRCULAR SAW.
Diameter of saw..... 15 in.
Length of saw arbor..... 2 1/4 "
Height from floor to table..... 33 "
Size of table..... 48 1/2 x 36 "
Number of revolutions per minute..... 7,000
Weight..... 1 1/2 lb.

Total Weight of Combination,
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The best English Anvils become hollowing on the face by continued hammering in use, on account of the fibrous nature of the wrought iron—causing it to "settle" under the face.

The body of the Eagle Anvil is of crystallized iron, and no settling can ever occur; the steel face, therefore, remains perfectly true. Also, it has the great advantage that being of a more solid material, and consequently with less rebound, the piece forged receives the full effect of the hammer, instead of a part of it being wasted by the rebound, as of a wrought iron anvil. An equal amount of work can, therefore, be done on this Anvil with a hammer one fifth lighter than that required when using a wrought iron anvil.

The working surface is in one piece of JESS-UP'S BEST TOOL CAST STEEL, which, being accurately ground, is hardened and given the proper temper for the heaviest work. The body is covered with and its extremities made entirely of steel. The body of the Anvil is of the strongest grade of American iron, to which the cast steel face is warranted to be thoroughly welded and not to come off.

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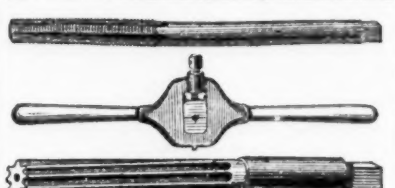
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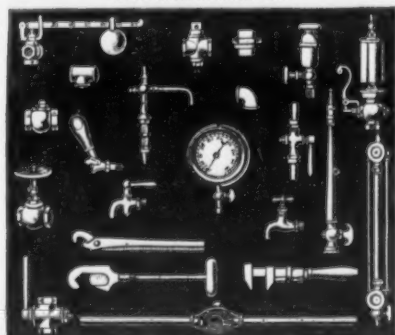


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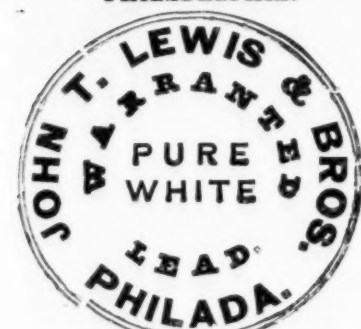
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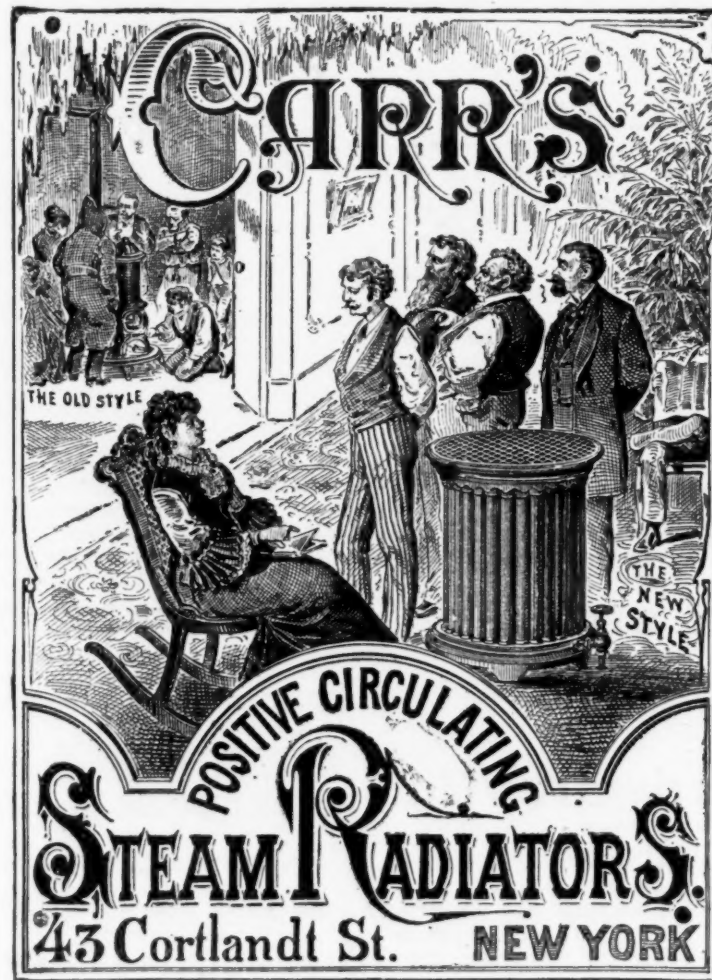
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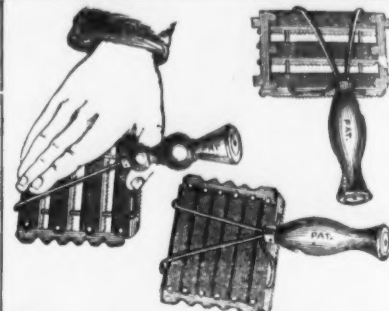
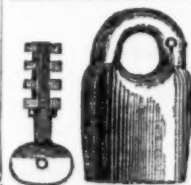
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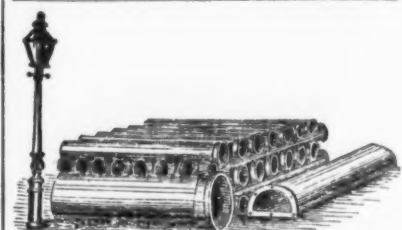
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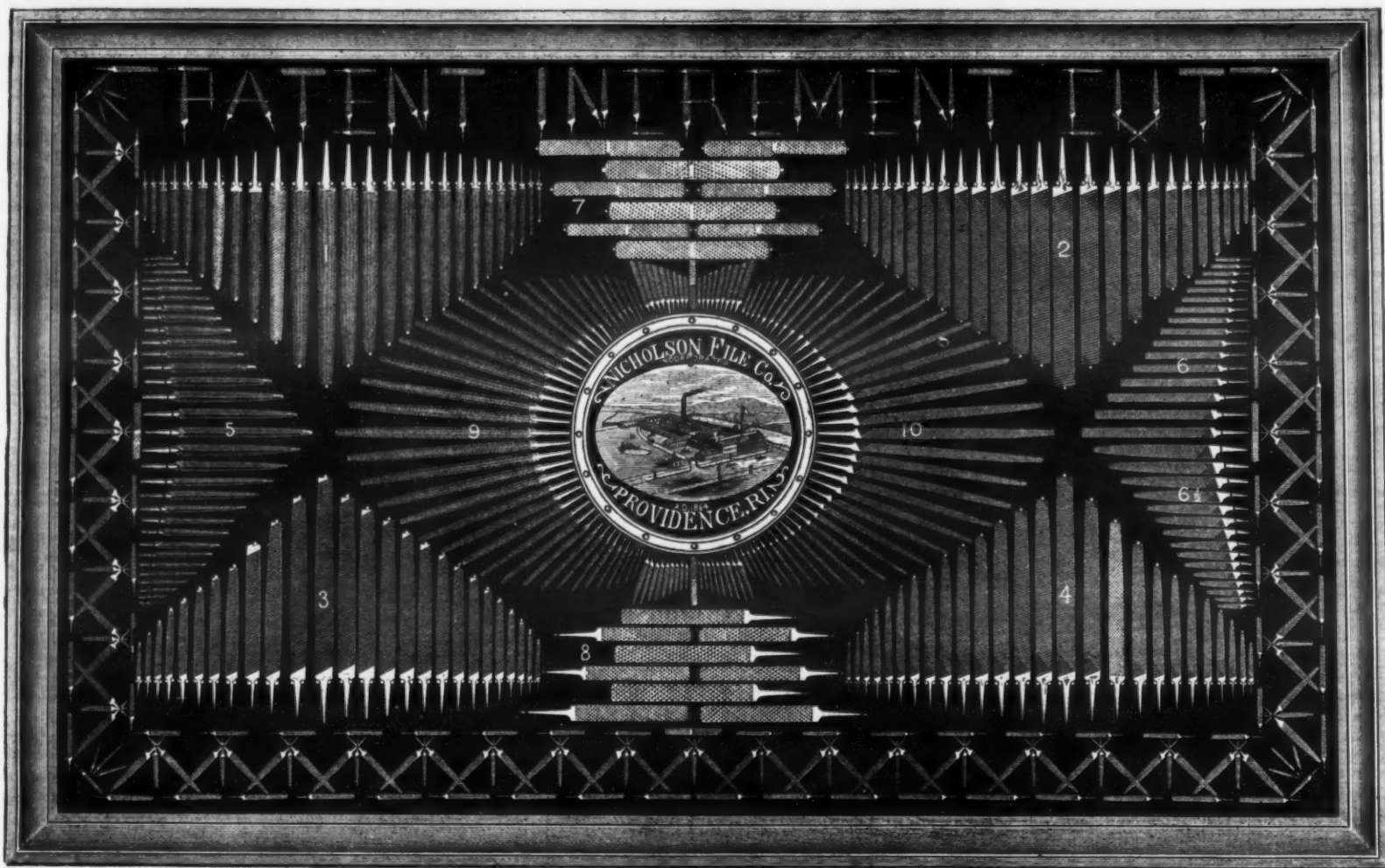
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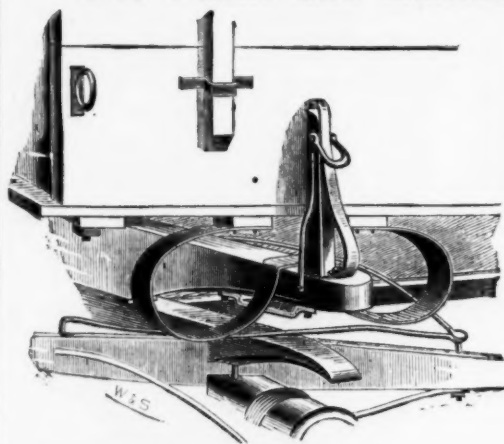
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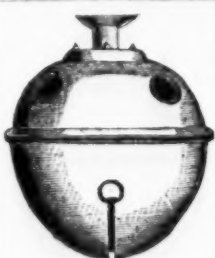
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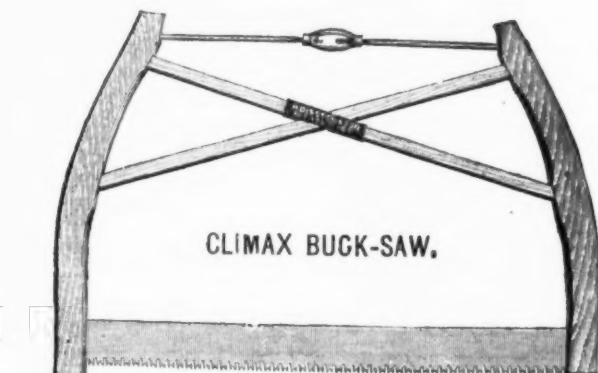
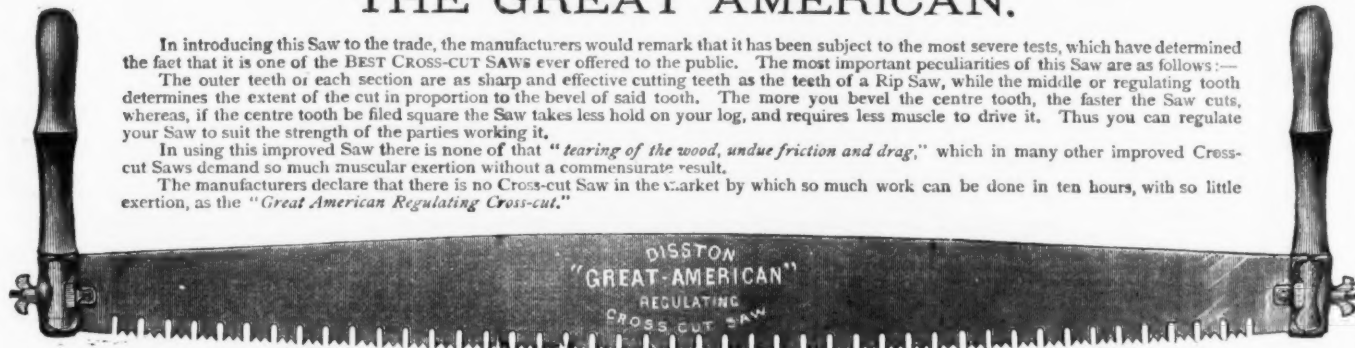
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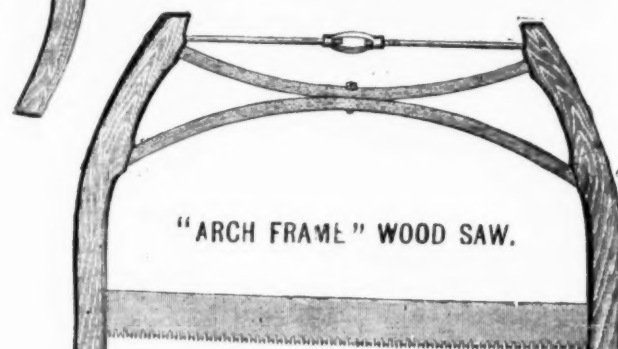
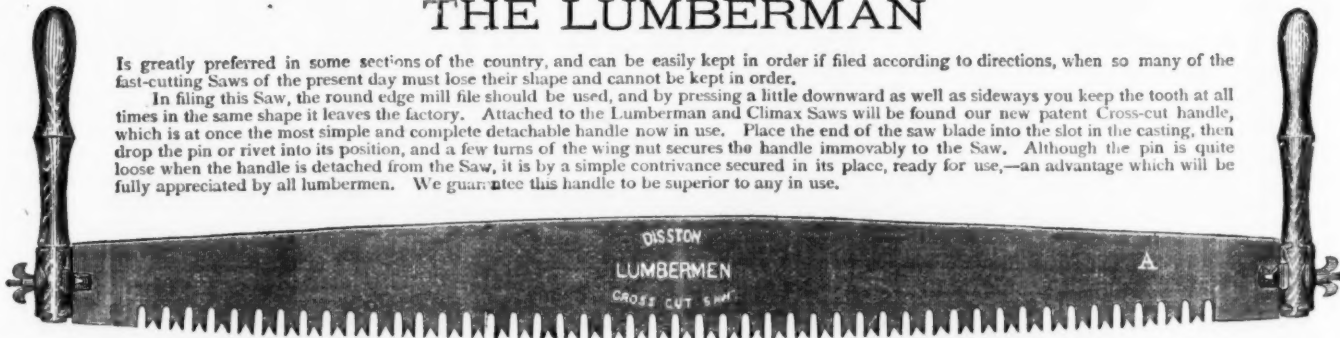
THE GREAT AMERICAN.

In introducing this Saw to the trade, the manufacturers would remark that it has been subject to the most severe tests, which have determined the fact that it is one of the BEST CROSS-CUT SAWS ever offered to the public. The most important peculiarities of this Saw are as follows:—
The outer teeth of each section are as sharp and effective cutting teeth as the teeth of a Rip Saw, while the middle or regulating tooth determines the extent of the cut in proportion to the bevel of said tooth. The more you bevel the centre tooth, the faster the Saw cuts, whereas, if the centre tooth be filed square the Saw takes less hold on your log, and requires less muscle to drive it. Thus you can regulate your Saw to suit the strength of the parties working it.
In using this improved Saw there is none of that "tearing of the wood, undue friction and drag," which in many other improved Cross-cut Saws demand so much muscular exertion without a commensurate result.
The manufacturers declare that there is no Cross-cut Saw in the market by which so much work can be done in ten hours, with so little exertion, as the "Great American Regulating Cross-cut."



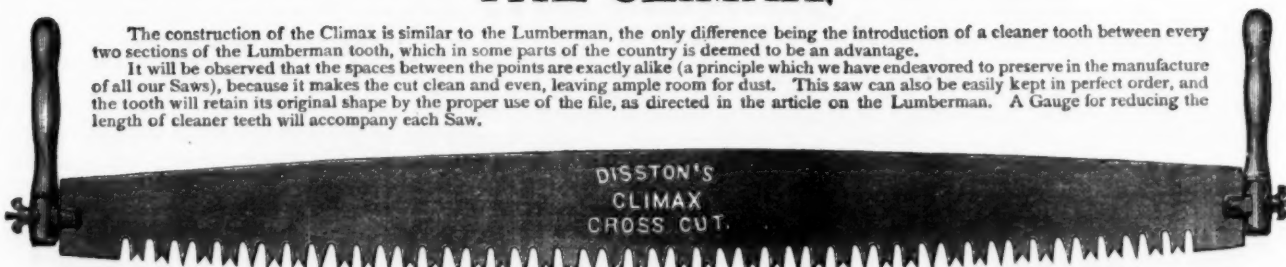
THE LUMBERMAN

Is greatly preferred in some sections of the country, and can be easily kept in order if filed according to directions, when so many of the fast-cutting Saws of the present day must lose their shape and cannot be kept in order.
In filing this Saw, the round edge mill file should be used, and by pressing a little downward as well as sideways you keep the tooth at all times in the same shape it leaves the factory. Attached to the Lumberman and Climax Saws will be found our new patent Cross-cut handle, which is at once the most simple and complete detachable handle now in use. Place the end of the saw blade into the slot in the casting, then drop the pin or rivet into its position, and a few turns of the wing nut secures the handle immovably to the Saw. Although the pin is quite loose when the handle is detached from the Saw, it is by a simple contrivance secured in its place, ready for use,—an advantage which will be fully appreciated by all lumbermen. We guarantee this handle to be superior to any in use.



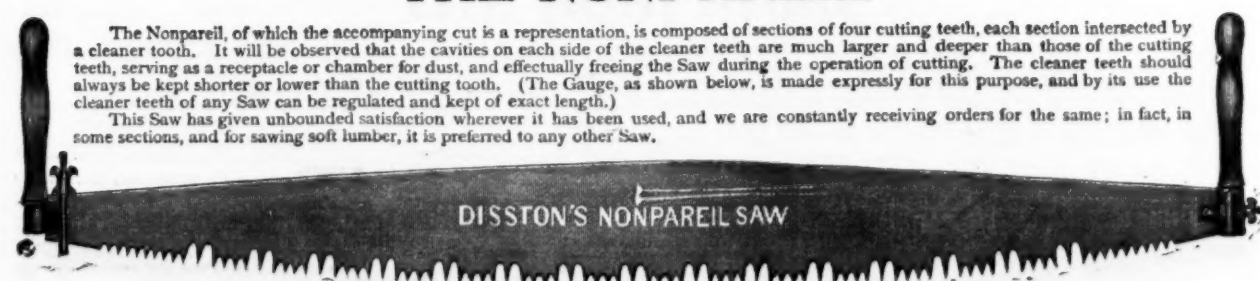
THE CLIMAX.

The construction of the Climax is similar to the Lumberman, the only difference being the introduction of a cleaner tooth between every two sections of the Lumberman tooth, which in some parts of the country is deemed to be an advantage.
It will be observed that the spaces between the points are exactly alike (a principle which we have endeavored to preserve in the manufacture of all our Saws), because it makes the cut clean and even, leaving ample room for dust. This saw can also be easily kept in perfect order, and the tooth will retain its original shape by the proper use of the file, as directed in the article on the Lumberman. A Gauge for reducing the length of cleaner teeth will accompany each Saw.



THE NONPAREIL.

The Nonpareil, of which the accompanying cut is a representation, is composed of sections of four cutting teeth, each section intersected by a cleaner tooth. It will be observed that the cavities on each side of the cleaner teeth are much larger and deeper than those of the cutting teeth, serving as a receptacle or chamber for dust, and effectually freeing the Saw during the operation of cutting. The cleaner teeth should always be kept shorter or lower than the cutting tooth. (The Gauge, as shown below, is made expressly for this purpose, and by its use the cleaner teeth of any Saw can be regulated and kept of exact length.)
This Saw has given unbounded satisfaction wherever it has been used, and we are constantly receiving orders for the same; in fact, in some sections, and for sawing soft lumber, it is preferred to any other Saw.



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Cast.	dis 10
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Case.	dis 10
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Axe Stone.	dis 10
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Washita Stone.	dis 10
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Half.	dis 10
Full.	dis 10
Carpet, Am. and Swedes.	dis 10
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Brads, Half Weight.	dis 10
Brads, 4ths and longer, Sec. 3 1/2, 9 1/2, 1 1/2, 2 1/2, 3 1/2, 4 1/2, 5 1/2, 6 1/2, 7 1/2, 8 1/2, 9 1/2, 10 1/2, 11 1/2, 12 1/2, 13 1/2, 14 1/2, 15 1/2, 16 1/2, 17 1/2, 18 1/2, 19 1/2, 20 1/2, 21 1/2, 22 1/2, 23 1/2, 24 1/2, 25 1/2, 26 1/2, 27 1/2, 28 1/2, 29 1/2, 30 1/2, 31 1/2, 32 1/2, 33 1/2, 34 1/2, 35 1/2, 36 1/2, 37 1/2, 38 1/2, 39 1/2, 40 1/2, 41 1/2, 42 1/2, 43 1/2, 44 1/2, 45 1/2, 46 1/2, 47 1/2, 48 1/2, 49 1/2, 50 1/2, 51 1/2, 52 1/2, 53 1/2, 54 1/2, 55 1/2, 56 1/2, 57 1/2, 58 1/2, 59 1/2, 60 1/2, 61 1/2, 62 1/2, 63 1/2, 64 1/2, 65 1/2, 66 1/2, 67 1/2, 68 1/2, 69 1/2, 70 1/2, 71 1/2, 72 1/2, 73 1/2, 74 1/2, 75 1/2, 76 1/2, 77 1/2, 78 1/2, 79 1/2, 80 1/2, 81 1/2, 82 1/2, 83 1/2, 84 1/2, 85 1/2, 86 1/2, 87 1/2, 88 1/2, 89 1/2, 90 1/2, 91 1/2, 92 1/2, 93 1/2, 94 1/2, 95 1/2, 96 1/2, 97 1/2, 98 1/2, 99 1/2, 100 1/2, 101 1/2, 102 1/2, 103 1/2, 104 1/2, 105 1/2, 106 1/2, 107 1/2, 108 1/2, 109 1/2, 110 1/2, 111 1/2, 112 1/2, 113 1/2, 114 1/2, 115 1/2, 116 1/2, 117 1/2, 118 1/2, 119 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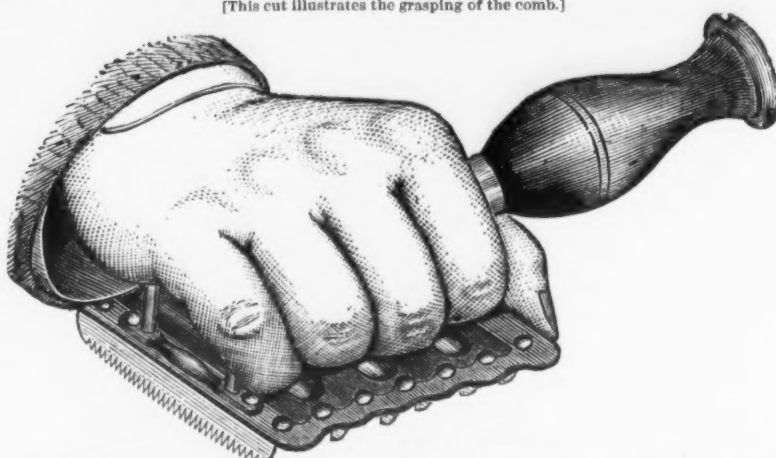
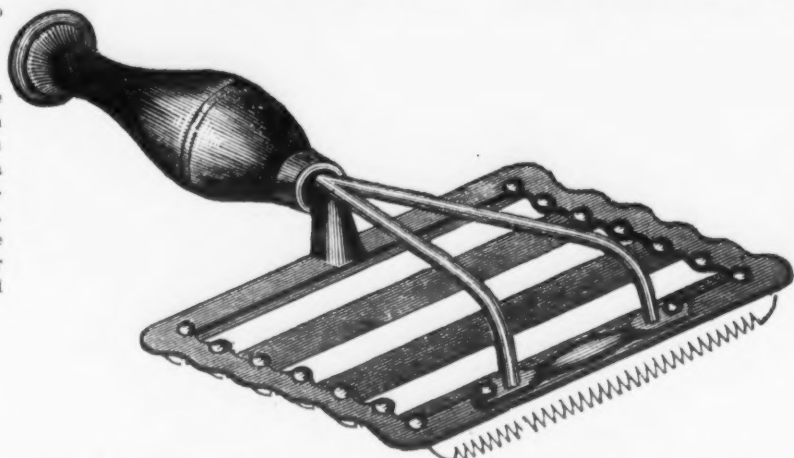
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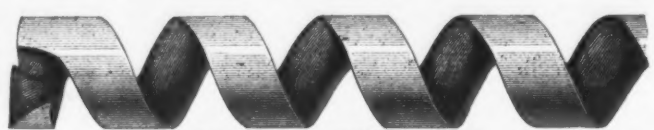


[This cut illustrates the grasping of the comb.]

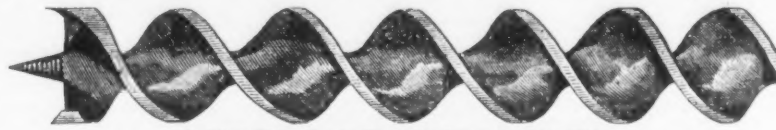
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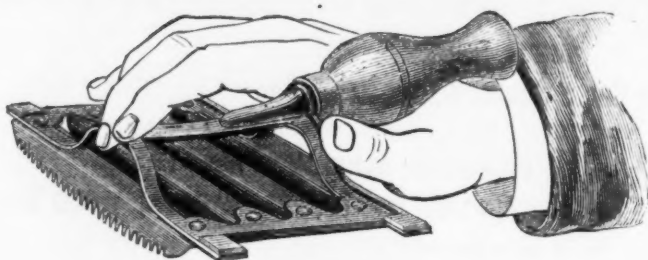
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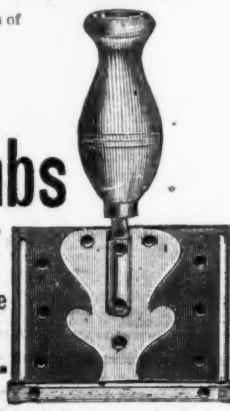
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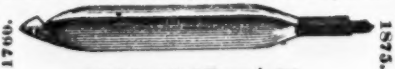


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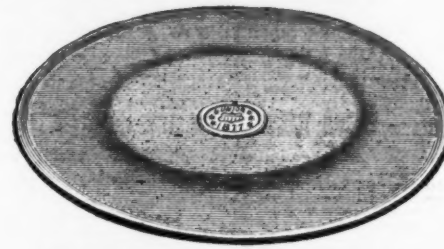


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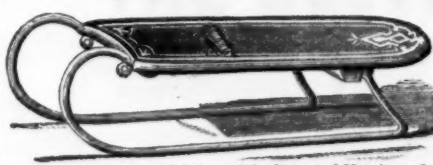
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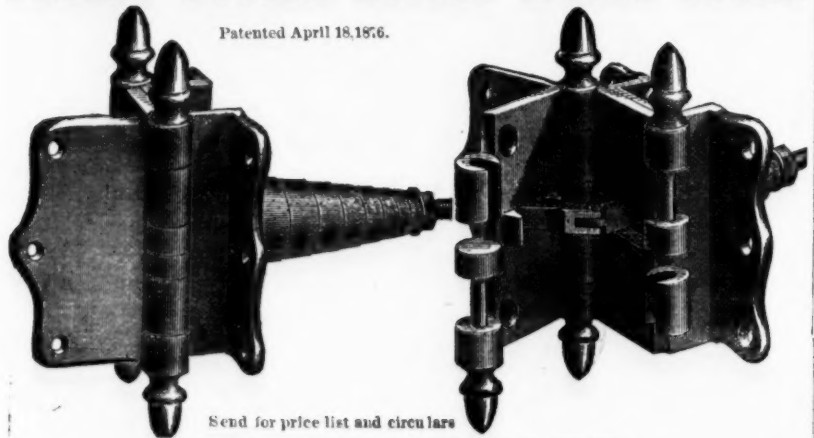
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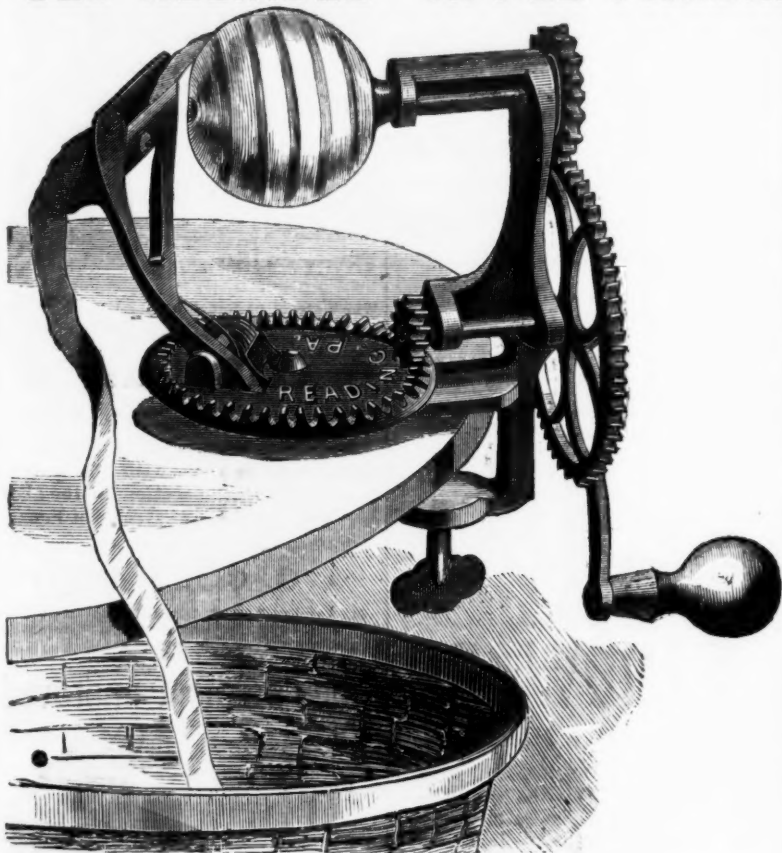
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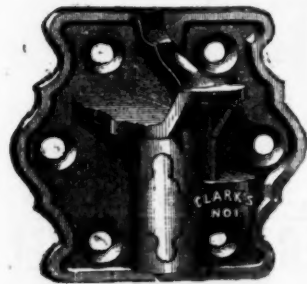
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A. G. COES'
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FERRULEWhich cannot be forced back
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secuted.

We call particular attention to our
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A PERFECT
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The American Lock Mfg. Co.,

Are the most SECURE and DURABLE ever made.

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Because they have 40 Brass Tumblers, independent in their action, either one of which will prevent the
Lock from being opened unless brought to proper position by the Key.

DURABLE

Because we use no Springs to break or get out of place.

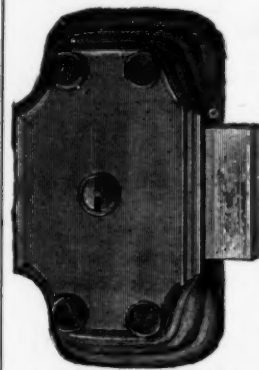
THEY HAVE

STERLING METAL KEYS

That will not corrode or wear, and are
stronger than steel.



FULL SIZE OF KEY.



Upright Rim Dead Locks,
Horizontal Rim Night Latches,
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Mortise Night Latches, Plain Fronts,
Mortise Night Latches, Ornamental Bronze
Fronts and Knobs,

Brass Chest, Box, Cupboard and
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Solid Bronze Padlocks.

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Chisels.
 Socket Framing, 10 @ 10 1/2
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Files.
 Nicholson Mill Files, new list, 10 @ 10 1/2
 Bastard, 10 @ 10 1/2
 Taper, 10 @ 10 1/2
 Butcher's Mill, 10 @ 10 1/2
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Hammers.
 Yocco & Plumb's, new list, 10 @ 10 1/2
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 Verce, 10 @ 10 1/2

Hatchets.
 Shingling and Half, 10 @ 10 1/2
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 Shingling and Half, 10 @ 10 1/2
 Claw, 10 @ 10 1/2
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Hinges.
 Rim and Mortise, 10 @ 10 1/2
 Door Locks, Rim and Mortise, 10 @ 10 1/2
 Tilt and Cupboard Locks, 10 @ 10 1/2
 American Padlocks, 10 @ 10 1/2
 Scandinavian Padlocks, 10 @ 10 1/2
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Knobs.
 Rim and Mortise, 10 @ 10 1/2
 Door Locks, Rim and Mortise, 10 @ 10 1/2
 Tilt and Cupboard Locks, 10 @ 10 1/2
 American Padlocks, 10 @ 10 1/2
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Locks and Latches.
 Door Locks, Rim and Mortise, 10 @ 10 1/2
 Tilt and Cupboard Locks, 10 @ 10 1/2
 American Padlocks, 10 @ 10 1/2
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Lanterns.
 Square Candle and Oil, 10 @ 10 1/2
 Globe for Oil, 10 @ 10 1/2
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 Western Pattern, 10 @ 10 1/2
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Machetes.
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Rakes.
 Cast Steel Garden, 10 @ 10 1/2
 Malleable Garden, 10 @ 10 1/2
 Wood Head Iron Teeth, 10 @ 10 1/2

Stretcher.
 American Pattern, 10 @ 10 1/2
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ST. LOUIS, MO.
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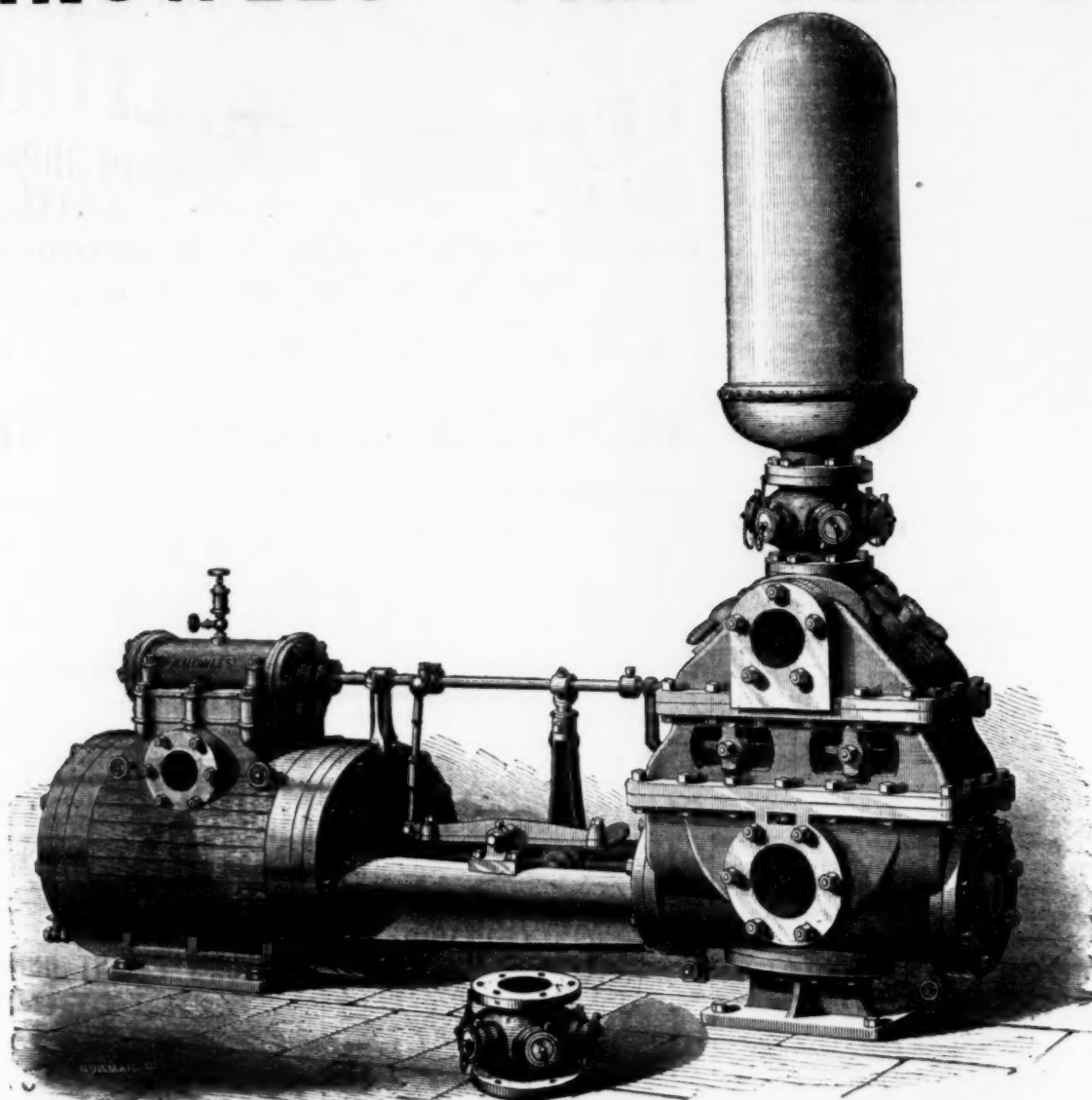


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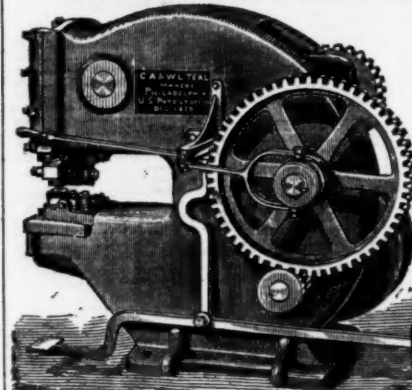
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Manufacturers of IMPROVED BENDING ROLLS

Arranged for Removing Work from the end of top roll.



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Punching & Shearing Machines,
With "Automatic Stop motion,"
Adjustable to any point of the stroke.

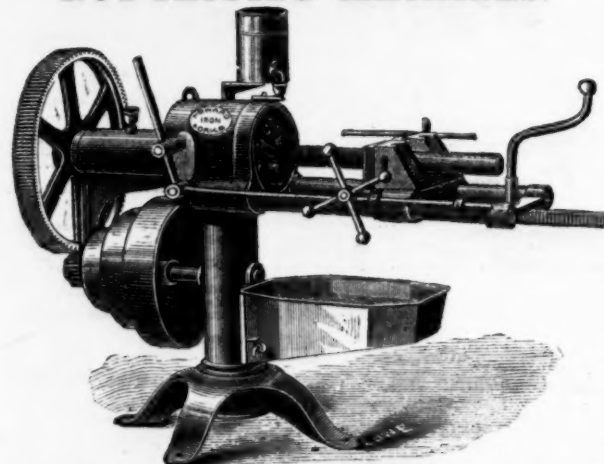
Single Power Punching Machines,
With Shearing Attachments.

Steam Riveting Machines,
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MACHINERY
In general.

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The best, cheapest and most rapid Bolt Cutter made. Nearly a thousand in use. First Premium, Centennial Exhibition. Six different sizes; smallest cuts threads on bolts, and taps nuts from one-fourth to one and one-fourth inches; the largest to three inches. Send for circulars giving full particulars and prices.

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Ludlow Valve Mfg. Co.,

OFFICE AND WORKS:

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(Double and Single Gate, 1/4 in. to 48 in.—outside and inside Screws, Indicator, &c.)
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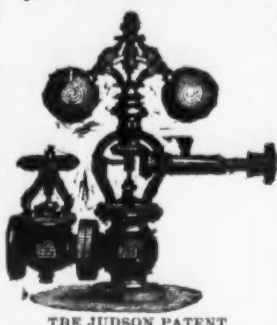


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It is a common method to advertise Governors without cost, unless satisfactory to the customer, and then charge High Prices for doing what any good Governor will do. Various Governors inferior to the "Judson" are sold in this way, operating well enough for three months, to insure collection of the pay, but becoming useless after a year's wear—their construction lacking durability. The Judson Governor is guaranteed to be not only the best Regulator of Steam Engines, but also the most durable Governor made. Parties in buying other Governors should stipulate that their durability be guaranteed, and should also take care that they do not for much inferior Governors, pay higher prices than those shown in the accompanying list. We guarantee the Judson Governor will do all any other Governor can do, and in Accuracy and Durability—the main essentials—we guarantee it shall do more.

Reduced Price List, FEBRUARY 1, 1877.

For dimensions of Governor, see Illustrated Price List.



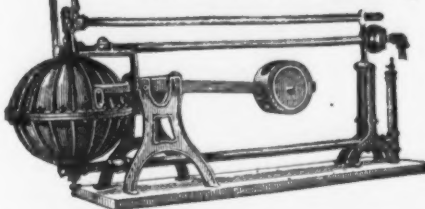
THE JUDSON PATENT Improved Steam Governor.

Size, Inch.	Pat. In.	Bright Fin. In.	Extra for Spec. In.	Stop Valve.
1/4	\$16.00	\$18.00	\$1.00	..
1/2	28.00	30.00	2.00	5.00
3/4	32.00	34.00	2.00	5.00
1	36.00	38.00	2.25	6.00
1 1/4	40.00	42.00	2.50	8.00
1 1/2	44.00	46.00	2.75	10.00
1 3/4	48.00	50.00	3.00	12.00
2	52.00	54.00	3.25	14.00
2 1/4	56.00	58.00	3.50	16.00
2 1/2	60.00	62.00	3.75	18.00
2 3/4	64.00	66.00	4.00	20.00
3	68.00	70.00	4.25	22.00
3 1/4	72.00	74.00	4.50	24.00
3 1/2	76.00	78.00	4.75	26.00
3 3/4	80.00	82.00	5.00	28.00
4	84.00	86.00	5.25	30.00
4 1/4	88.00	90.00	5.50	32.00
4 1/2	92.00	94.00	5.75	34.00
4 3/4	96.00	98.00	6.00	36.00
5	100.00	102.00	6.25	38.00
5 1/4	104.00	106.00	6.50	40.00
5 1/2	108.00	110.00	6.75	42.00
5 3/4	112.00	114.00	7.00	44.00
6	116.00	118.00	7.25	46.00
6 1/4	120.00	122.00	7.50	48.00
6 1/2	124.00	126.00	7.75	50.00
6 3/4	128.00	130.00	8.00	52.00
7	132.00	134.00	8.25	54.00
7 1/4	136.00	138.00	8.50	56.00
7 1/2	140.00	142.00	8.75	58.00
7 3/4	144.00	146.00	9.00	60.00
8	148.00	150.00	9.25	62.00
8 1/4	152.00	154.00	9.50	64.00
8 1/2	156.00	158.00	9.75	66.00
8 3/4	160.00	162.00	10.00	68.00
9	164.00	166.00	10.25	70.00
9 1/4	168.00	170.00	10.50	72.00
9 1/2	172.00	174.00	10.75	74.00
9 3/4	176.00	178.00	11.00	76.00
10	180.00	182.00	11.25	78.00

No Charge for Box and Cartage.

JUNIOR JUDSON & SON, Rochester, N. Y.

The Albany Steam Trap.



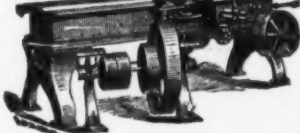
This Trap automatically drains the water of condensation from Heating Coils, and returns the same to the Boiler whether the Coils are above or below the water level in Boiler, thus doing away with pumps and other mechanical devices for such purposes. Apply to

Albany Steam Trap Company, Albany, N. Y.

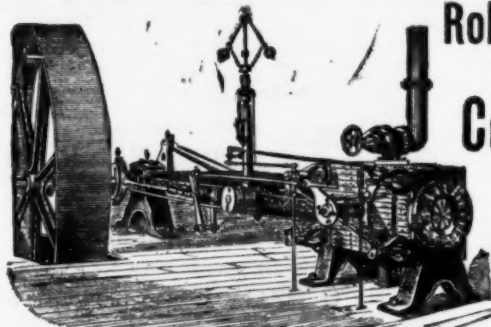
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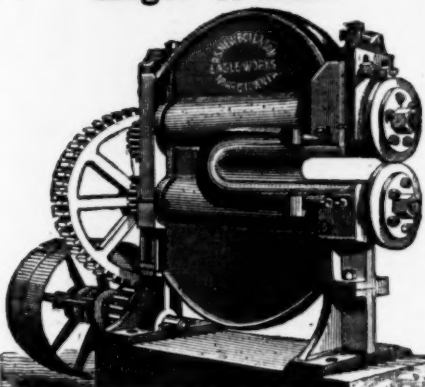


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BUILDERS, Shafting & Gearing, Boiler Makers.

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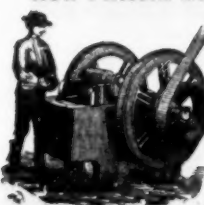
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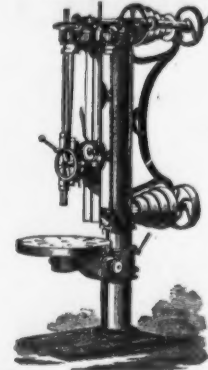
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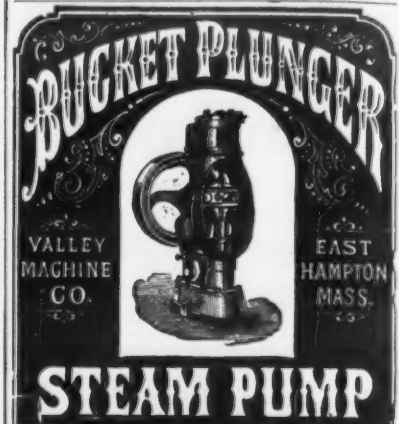
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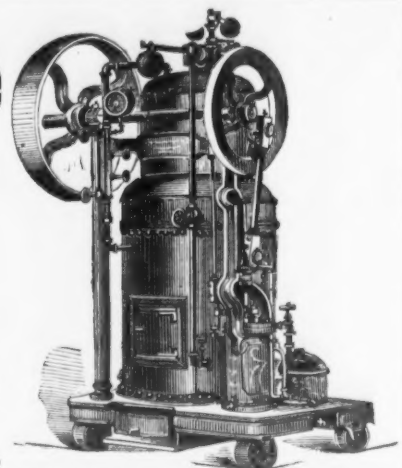
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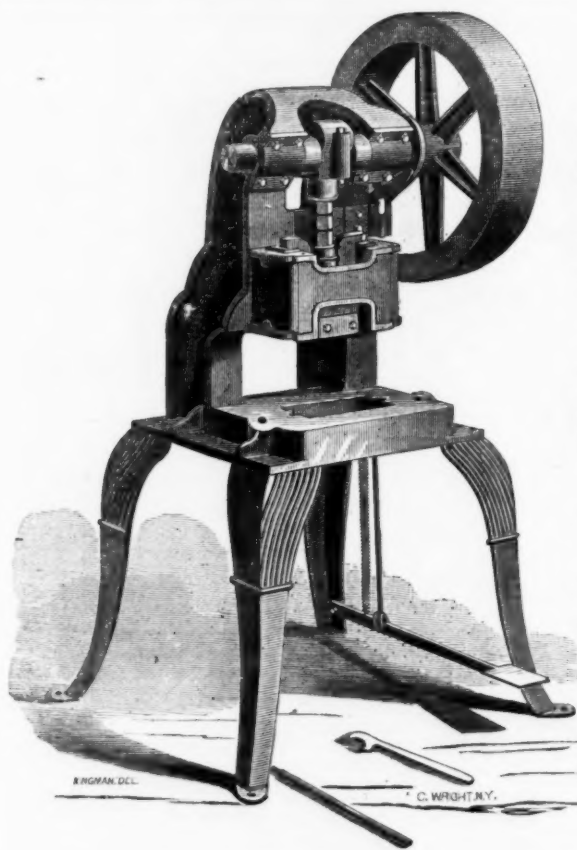
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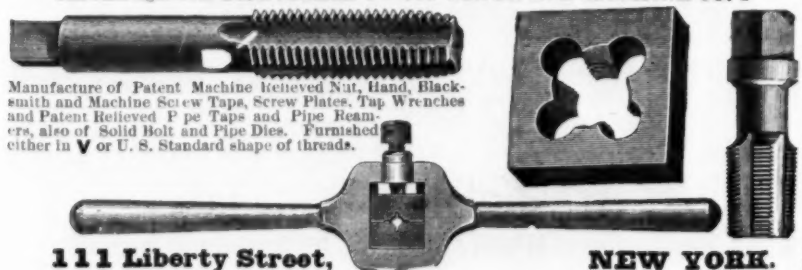
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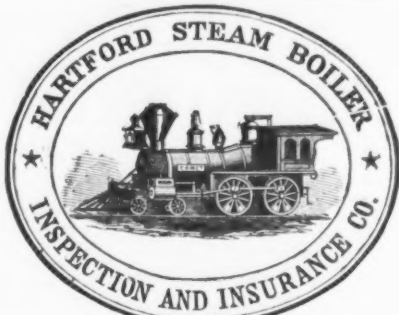
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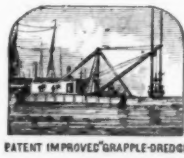
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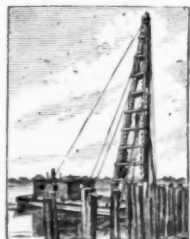
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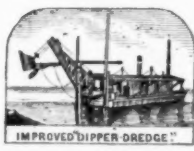
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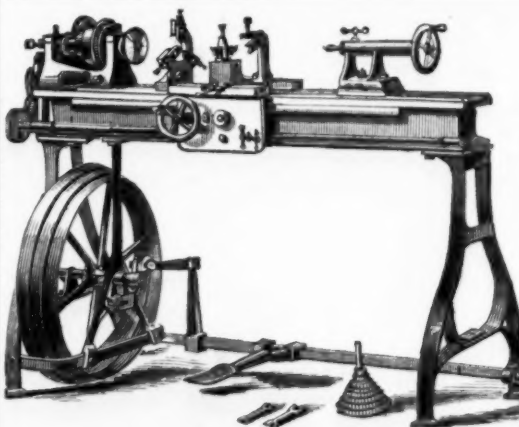
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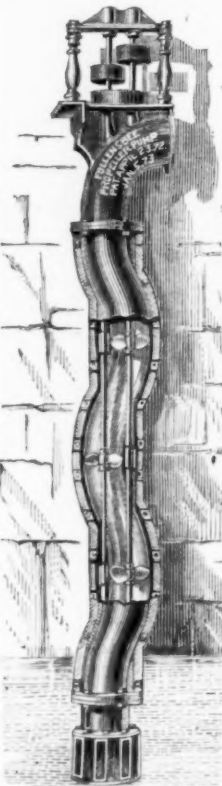
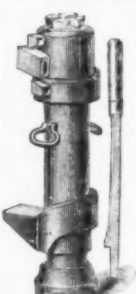
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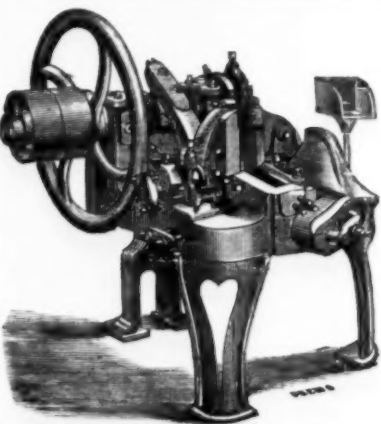
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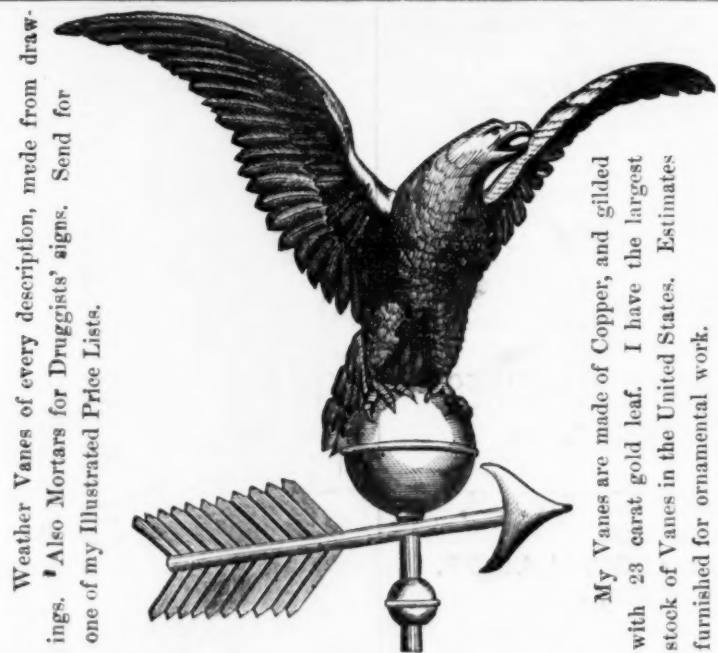
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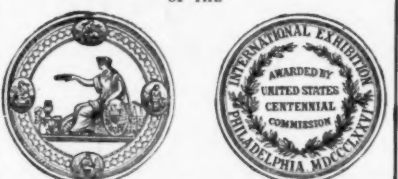
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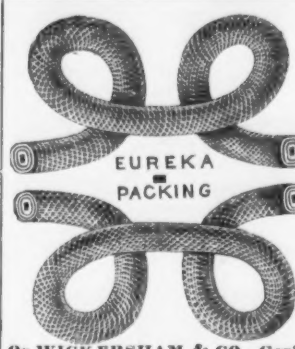
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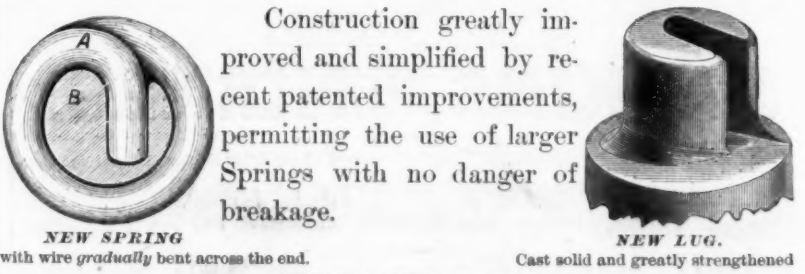
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